COSC2196 INTRODUCTION TO INFORMATION TECHNOLOGY

ASSIGNMENT 2: OMEGA RUBY TEAM PROJECT

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PREPARED BY

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Team Profile

Personal Information

Van Nguyen
Student #: s3824188
GitHub Profile: https://akj981.github.io/IITAssignment1/

Van is an Australian of Vietnamese origin. He has previous commenced, but not completed, an Engineering degree. After working for a couple of years, Van instead decided to complete a Diploma of IT at Victoria University after it was pointed out to him by family that he spent a lot of time around computers.

Van developed an interest in Linux based systems after being introduced to it as a free, open-source operating system during his engineering degree. He enjoys disassembling and fixing a number of electronics such as desktop computers, laptops and Android mobile phones and derives satisfaction from seeing these work again. As a result of his prior IT studies, Van has a number of IT skills at present mostly in web development and design, including PHP, Bootstrap, SQL and Python.

Minh Hau Truong
Student #: s3859157
GitHub Profile: https://jerry0609.github.io/Profile/

Minh is originally from Vietnam and moved to Australia 8 years ago. He is a married father of a four-month-old boy which now takes up a lot of his time. He has previously completed an Advanced Diploma of Business Administration but after working in the relevant field found that the work did not suit him.

Spending a lot of time with computers when he was younger learning for school and studying a new language piqued his interest in information technology. He is also fascinated by the ongoing innovation and development of various technology products, be that the constant change of mobile phones from the bulky items of the 90s to the comparatively smaller but more feature rich ones of today, or the increasing use of robots and artificial intelligence to make life easier and more efficient. Minh has no prior IT experience.

Sisi Meng Shih Liu
Student #: s3855898
GitHub Profile: https://sml25.github.io/My-Profile/

An Australian of Chinese origin, Sisi moved to Hong Kong and currently works as an account manager that deals with the client facing aspects of various IT financing solutions. This occurred after beginning and then deferring a Bachelor of Arts at the University of Sydney / University of New England. She has a keen interest in wine, so much so that she completed a level 1 course at the Asia Wine Service and Education Centre, travel, running, and Korean Culture. She is able to speak English, Cantonese and Mandarin, as well as Korean to a basic level.

She has no formal IT experience but has worked closely with various teams for a number of years that has required some IT knowledge. Her interest in IT was sparked by her work and a desire to be able to better understand and explain the IT aspects of her job to clients. She hopes to one day transition into a technical related position.

Darren Miral
Student #: s3858795
GitHub Profile: https://darrenmiral.github.io/

Born and raised in Melbourne, Australia to Sri Lankan immigrants, Darren is undertaking his second Bachelor Degree, having previously obtained one form Monash University in 2012. He has an intellectual curiosity regarding a number of subjects such as history, astronomy, chemistry and fine art and loves quiz shows.

Like many others, his interests in information technology stems from video games. He feels that his enjoyment of troubleshooting, both in the context of IT and elsewhere, would be put to good use in the IT field. Unfortunately, he has no IT experience prior to undertaking a Bachelor of IT degree from RMIT via OUA beyond building a PC and setting up a NAS on his home network to store multimedia files.

Malcolm Tsang
Student #: s3333925
GitHub Profile: https://malcolmtsang.github.io/Profile/

Malcolm was born in Australia and is of Chinese descent. Despite not being able to speak it, he is able to understand spoken Cantonese. Malcolm has previously completed a Bachelor of Mechanical Engineering at RMIT and is a big sports fan – particularly of Australian Rules Football and soccer, where he supports Essendon FC and Manchester United respectively.

His interests in IT began with playing computer games against his brother and the fascination of how the technology and games constantly improved over time. It is this innovation and constant improving technology that gets me interested into thinking what is next? Malcolm does not yet have any relevant IT experience.

Team Profile and Ideal Careers

Van Nguyen

- Myers-Briggs Type Indicator – ISFJ-T “Turbulent Defender”

Minh Truong

- Myers-Briggs Type Indicator – INFP “The Healer”
- Learning Style (VARK) - Tactile
- Big Five Personality Test – Extraversion 3, Agreeableness 45, Contentiousness 41, Emotional Stability 52, Intellect/Imagination 8

Sisi Meng Shih Liu

- Myers-Briggs Type Indicator – ISFJ-A “Assertive Defender”
- TestColor Personality Test – Energy 137; Intellectual Performance 116; Dynamism 111; Management Skills 109
- “Skills You Need” Interpersonal Skills Self-Assessment – 64% (“Interpersonal skills are about average compared to other people”)

Darren Miral

- Myers-Briggs Type Indicator - INTJ
- Learning Style (VARK) - Multimodal
- Big Five Personality Test – Extraversion 23, Agreeableness 52, Contentiousness 50, Negative Emotionality 29, Open mindedness 52

Malcolm Tsang

- Myers-Briggs Type Indicator – ISFJ-A “Assertive Defender”
- Learning Style (Emtrain Learning Style) – “Reflector”
- USC Leadership Style Test – “Contrarian Leader”

Despite its limitations, as the Myers-Briggs Type Indicator (MBTI) test is the only one consistent between all members of the team, it will form the basis of the analysis of how such testing might inform the group.

All five members are introverts according the MBTI, which will likely mean that everyone in the team will need to actively communicate with each other to ensure their point of view is heard. The lack of any overtly extroverted members within the group will likely have both positives, such as it being unlikely for one person to be domineering and talk over the entire group, and negatives, especially in the event of a presentation.

A number of these MBTI types are also associated with perfectionism. While an element of perfectionism can be a good thing, especially when it comes to group projects where it can be necessary to ensure things don’t “slip through the cracks”, too much perfectionism can hinder progression of the project if the team becomes fixated on less important tasks. That all three types are dedicated and hard-working bodes well for the group as it is unlikely that there will be members who do not contribute sufficiently. This also means that it is less likely that team members may develop frustrations with another due to a perceived lack of input.

Within this team of five people, there are only two that declared their “ideal job” to be the same one, with both Malcolm and Minh desiring to become software engineers. Van, with his previous experience with Linux systems, hopes to become a Linux system administrator while Kyla aims to become a cloud engineer, which stems from her prior work history.

Lastly, Darren has listed his ideal job as a network engineer. Between the five jobs, Linux system administrator and network engineer have the most similarities between them with both dealing with setting up, maintaining and troubleshooting computers and the networks they are connected to, although they are considered to be at different levels and therefore require differing levels of experience (Ali, 2018; Fieldengineer.com, 2019).

It can be argued that the job of a cloud engineer can be similar to either that of a network engineer, as they can be required to both manage cloud network (Stewart, 2019), or of a software engineer, designing and implementing software to suit the needs of their client (Intellipaat Blog, 2019), depending on their specific role. The role of software engineer can also be quite varied depending on what is required by the job and/or client, but generally involves designing, developing and creating various software implementations, either at the application or system level (Indeed.com, 2019). Across the group, the majority have listed “ideal jobs” that require a moderate degree of experience beyond a Bachelor’s degree.

Tools

Several applications have been used by the team members to facilitate the completion of this group project. These include the creation of a group website through GitHub Pages, which can be found at the following link:

https://darrenmiral.github.io/OmegaRuby/

The GitHub repository for this website can be found here:

https://github.com/DarrenMiral/OmegaRuby

Most of the group's discussion has been conducted using the well-known collaboration software Slack (Slack, 2019) to enable real time communication between team members despite living in different cities and time zones. Several screenshots of conversations held on this software have been provided to illustrate how the group has worked together (see Appendices 1-4).

Other tools used to generate this group report include Microsoft Office; EndNote, for reference management; and OneDrive.

Van created the Slack channel and the rest of the team members soon joined and began communicating well with each other, quickly setting up a time where all would be available to discuss in real time how the group would tackle the project. This first meeting, and subsequent meetings, were quite constructive and with minimal disagreements. We believe that these screenshots provided in the appendices provide an accurate representation of how the group worked and show that everyone contributed to the preparation of this report.

Industry Data

The specific job titles of the group's ideal jobs are as follows:

- Van Nguyen – Technical Support and Server Administrator
- Minh Hau Truong – Senior Software Engineer
- Sisi Liu – Cloud Engineer
- Darren Miral – Network Engineer
- Malcolm Tsang – Software Engineer

These jobs form a wide-ranging group, both in seniority, scope and desirability. Looking at the data from early 2018 provide from the Labor Insight Tool by Burning Glass Technologies (Burning Glass Technologies, 2018) can be confusing for a number of reasons. Due to there being no agreed upon taxonomies for job titles (Korbel, 2018), this results in a number of very similar jobs being listed in separate categories in the data. As the data is taken from job advertisements from a number of places including popular job vacancy websites and directly from employer's websites, and that the same job being listed in multiple locations results in it being counted multiple times (Korbel, 2018), this can also lead to a misleading number of jobs appearing. Despite these potential pitfalls in the data, it is clear that roles similar to software engineer are in high demand, as evidenced by it being the top occupational group within the Burning Glass "Top Occupations" data set for Information Technology jobs and having twice as many job listings as the next group.

Systems administrators also appear to be in high demand, with that job title being the third most common in the same data set. Network engineer does not place as highly in the list of "Top Occupations", coming in in 15th place, although still with a healthy number of jobs, especially considering it is a more senior position than a number of the jobs found above it on the list. Cloud engineer does not appear on either the "Top Occupations" or the Burning Glass "Top Titles" lists, however it does appear to be a rapidly growing sector, at least in the United States of America, based a rapid growth in both job searches and employer interest in people with Cloud-based skills according to jobs website Indeed (DeNisco Rayome, 2018).

Coalescing the IT-specific skills of the group's ideal jobs into one skill set is a difficult one due to the diverse nature of the jobs and the resultant job-specific knowledge, skills and languages required. Despite that, the majority of the jobs listed knowledge of Python, Java and database knowledge such as SQL, while multiple listings included OpenStack, Oracle and Linux skills as requirements. Taking these six IT-specific skills and comparing those to the Labor Insight data from Burning Technologies, it is clear that SQL and Java are both very highly sought-after skills as they are the top and third-top listed skills in demand. Linux, Oracle and Python also feature in the list of the 23 most in demand skills at that particular point in time. OpenStack was not included in the list, but this may be due in part because of the relative newness of cloud computing being seen as desirable in the workplace.

Beyond specific IT skills required for any job, a number of baseline skills are also clearly desired by potential employers when looking at the Labor Insights data by Burning Glass. Teamwork, problem solving and communication were common to almost all of the listed "ideal jobs", with some further specifying that communication with clients being particularly important. Time and task management skills were also listed multiple times, along with reliability, motivation and leadership. The Labor Insights data clearly shows good that communication is the most in-demand skill within the information technology industry, and this may be due in part to a desire to avoid the stereotype that exists in the general public about those in the industry. Problem solving, organisational skills and teamwork/collaboration with the second, third and fifth most requested generic skills in advertisements in the given time period.

Looking at the data provided there are a number of skills that ranked highly with employers within the sector that do not fall within the sphere of skills required by the group. These include JavaScript (and by extension other web development skills), Microsoft Windows and "project management". Given the high ranking of technical support and customer support on the list of IT-specific skills, what appears to be a very generic skill requirement of Microsoft Windows likely refers to the maintenance and support of systems using the popular operating system, particularly in relation to job advertisements for level 1 technical support and system/network administration positions.

Project management is arguably not an information technology industry specific skill given it was the sixth most mentioned flagship skill of all job advertisements in the United States in 2018 (Stack et al., 2019), but given it combines the sought-after generic skills involving communication, team work and organisation, it easy to see how it would be so highly ranked. Writing, detail-oriented and creativity were the three highest ranked generic skills according to the Labor Insight data that would not be part of the group's job requirements, although writing was listed in at least one of the individual job advertisements selected. Creativity as a job requirement in the context of the IT industry likely most applies to those wishing to work in website development or graphic design, and as this is not the desired career path of any of the group is it understandably not of the group's required skills.

After reviewing the data, there does not appear to be cause for any of the members of the team to have already changed their opinion of their ideal job. Two of the ideal jobs chosen (system administrator and software engineer) between three of the team members were within the three "top occupations" in the industry, and a fourth, in cloud engineer, was chosen with full knowledge that it is seen as a growth area 2018 (Stack et al., 2019).

That the fifth of the ideal jobs within the group, that of network engineer, was not particularly highly placed could be seen as some cause for concern as to the demand or viability of the career into the future, but this can be explained by its relative seniority to other jobs within the data set. Further investigation using more recent job advertisement data, and potentially anecdotal data by those currently employed in positions similar to cloud engineer and network may be warranted to further elucidate whether the reasons given for the lower apparent demand for these jobs hold true.

IT work

Interview of an IT Professional

Software Engineer - please refer to the recording on GitHub site

1. Can you briefly tell us what prior learning/qualifications you had before you started this job?

At university I studied BSc Computer Science, my university is famous for its strong mathematical background and can build specialized knowledge from the courses I have attended. It gave a solid academical background, not specialized in any current technologies, but taught the "big picture". Was still studying at university while working.

Before university I went to a special high school which was specialized in mathematics and informatics. I was always interested in this field, maybe because my father was a computer mechanic and I've learned typing on a keyboard before I learned to read. I could use the computer (and by use, I mean starting and playing with computer games) before I attended grammar school.

2. Please tell us about your IT work. What exactly do you do?

Ok. So, my situation is a bit special.

Currently I'm between projects so mainly studying the technology stack for it. It includes:

- Taking online courses in technologies (for example AWS) what is heavily used at my next assignment. Did the course on Udemy.
- Practicing some skills, I haven't used recently but will need,
- Preparing the development environment on my machine per the requirements of the new job,
- Reading documentation about my new employer's product and current architecture and studying topics I'm not confident around and will be needed, reviewing requirements
- Thought I'd only do coding, but not like that, still must review codes and check it.
- Clarifying functional/non-functional requirements of tasks (Speak with business side or architecture team) Huge part of the job, you need to know what needs to be built, otherwise problems will happen if you don't understand anything.

As you can see my current situation is special, so I will speak about my previous projects and talk about what were my tasks.

So, I was in a software engineer role all the time. The number of tasks I had to do were rising with my seniority.

In the end my normal day-to-day tasks were:

- Support: check incoming questions or bug reports
- Mentoring fellow developers on functional or technical questions
- Coding (of course)
- Reviewing another people's code
- Keeping in touch with product side when developing new components

You may need to learn a new tech stack based on next project.

Between projects need to keep learning new skills, new technical stack. Lifelong learning while working.

3. Please tell us about the industry you work in.

First job in the healthcare industry, I was working on an ECG software, Healthcare in cardiology, working ECG curves. Later I have transitioned to the investment banking sector.

Involved in Investment banking industry for many years and then worked for a bank. Currently in between 2 assignments and will be in Education. You will learn a lot of industries.

You will learn to work with doctors in healthcare, bankers in banking for example. Software developers will learn a lot of industries in your career, which is really interesting.

4. What other kinds of work do you have to do?

Apart from coding? I think the most important tasks are clarifying requirements with the product side and support. Usually there is a team who does support but when they don’t know they turn to us. We can clarify if the concern raised is a bug or feature.

Software engineering is not just about coding and doing the technical part, we have to get involved in the product development, we have to learn the domain, understand how the user works and then make our suggestions and sell it to the client. It is the most difficult part.

But back to the technical part as I have already mentioned my job includes mentoring other teammates when they have questions, I must review their code changes and support incoming requests.

Mentoring help each other technical or functional. Part of clarifying requirements keep in touch with product side. We need to understand product code. Sometimes we know it better, incoming requirement is contradicting we need to make sure and work with product to better suit the client.

5. Who are all the different people you interact with in your work? Please tell us about them

Other developers - we work together, review each other's code, decide on the technical solutions.

Architects - Tech leaders. I go to them with my technical questions, also they are the ones who guard the integrity and connectivity of the components. Most experienced, programming professional, guard quality of code and teams work together and synchronize work.

Product owners - We get the tasks from them and we discuss the functional questions and design problems we may find. Shielding us and first firewall in front of dev team.

Infrastructure/IT guys - Whenever something is not working, or we need access to a database or anything else then we call them and try to find a solution. Sometimes they find us too when they have trouble with - for example - deploying.

Client – Rare to have interactions. Some companies don't want to expose developers at some other places it is natural. Get shielded from them all the time. I personally had to jump on calls with clients only several times and had to personally meet with them a few times.

6. Please tell us about your interactions with other IT professionals.

Mentoring part of the job, otherwise new members can't get on board. Part of everyone jobs. Can call it mentoring, but it's simply sharing information. Specialized in something then you can share as part of teamwork.

If I specialize in something, turns out the project needs to move to another database SQL for example, then I will take lead and show the team if I am the most experienced one. That's how it works.

7. What about your interactions with clients or investors?

Can be dangerous, if you don't have social skills. Important to have a shield from the client so we don't get called directly and get bombarded.

It's a difficult question because in my experience we developers are always shielded from the clients. We originally weren't allowed to participate in any meetings or calls with them but sometimes we ended up on calls when the issue they were facing was too technical the business side couldn't help them. But it has happened only several times.

It is good to sometimes meet with clients though. I've had contact with clients before and thus rewrote software from the feedback, so it can be good to speak to the client, solution better fit the client's requirements in the end.

8. What aspects of your work do you spend most time on? Please tell us about these.

Understanding the task, and clarifying requirements, especially new in the job/industry.

I remember many times when I've spent a day with understanding requirements and the coding part took around 1 hour. After many years in 1 industry understanding requirement was easy, but I needed to work there for that long. Most challenging to build the right thing and to know what the right things is.

Coding can take long, not typically box product, more technical. Research fields like automobile for example designing new brake system for Porsche that is a research task, more academical and coding heavy and will take a longer time. If we are working for supplier for client, creating according to client's requirements, then understanding the tasks is most important.

9. Which aspects of your work do you find most challenging?

Understanding the tasks, need to be clear and need to set right at the beginning.

If the developer doesn't understand the product and don't get requirements correct, mistakes can happen, and you need to rewrite it again.

There are challenging technical problems too especially when a new architecture must be designed or a totally new component, and it can be super difficult too, but I think understanding the tasks is a bit more complex.

10. Can you share an example of the work you do that best captures the essence of the IT industry?

Nice story I'd like to share, my favourite example is a rewrite project which was partially led by me. There was a component in our software which was heavily used in conferences but was really slow and unstable. It was generating schedules which were printed and given to the conference attendees.

I was chosen to continue the work with that component and I had to learn it from scratch. It took a lot of time to understand it and I had prior experience before. We knew about this component before and it was very complex component and took a long time to understand it. We knew it should have been rewritten years ago but we were always told we don't have time for that. The technical debt in it was tremendous.

We were preparing for a huge conference which was also the big test of this component. Everything seemed ok. It was a nice Thursday evening when at the end of the day I packed my bag, took my coat, and said bye to my colleagues, when my architect has grabbed my arm. Tibi, don't go yet, I'm in a meeting, we may have to look at this component.

It has turned out the component stopped working. All of a sudden. Yesterday it was working, today: no and the client wanted to start using it next Monday. Thursday, Friday, Saturday and Sunday I went home around midnight. The component was built on webforms which I didn't have too much experience with, so I had to learn that architecture and build a solution which quick fixes the problem.

We came up with a temp solution for now, our only option. It was dangerous solution, but only option. Went to conference for support if anything goes wrong. It worked as it could be, not that well though and survived the week.

Most important part, is that we could provide proof to management it must be re-written.

I could finally sit next to people who were using the component and see what they are doing and how. So, when we have arrived at home, we could start redesigning the component and start a complete rewrite.

In this project, I took lead as I knew the most, started to re-design on how it should work. With product owners, we worked together in designing etc. I used my domain knowledge and experience and contributed to the design part too.

As lead, I gave out tasks, checking another people's work, mentoring etc. I was reporting to senior management about the progress and also did my part in coding. Built QA testing site and jump on call with clients.

In the end it was a huge success, we were praised by the client too.

Covered everything here on what a developer does, not just coding and may end up in other parts.

11. To keep abreast with the changing technologies, do you need to enrol in additional courses to upskill even when working full time? How do you keep up to date and adapt with new technologies and trends?

Whenever I join a new company, I always ask if they support new learning of courses and give time for that. Subscriptions such as Plural, LinkedIn, Udemy.

I personally have Udemy subscription, but companies may give to others as well. I usually learn from home and have a lot of free time. If you have family, important the company gives time, like 1 hour a day so you can spend for learning. It's important, also reading articles, new databases then surf the internet and read articles and learn by using.

In this perspective I'm in fortunate situation since I don't have a family, so I can learn and try new things in my free time. But if someone has kids then the only opportunity to learn is when working and I think it is crucial for every employer to secure study-time for the employees.

12. What hobbies do you have that are IT related? Are there any clubs, memberships, or subscriptions which you recommend joining?

I like tampering with my Raspberry PI, build from an idea. I like to practice coding and algorithms, I like to read articles and books about topics I'm interested in, like machine learning, genetic algorithms, AI, distributed systems.

Just to give some advice, do a Pet-projects. Home grow it and it will give you experience. Interested in AI, build an AI at home then, useful for next potential work opportunities.

13. IT is quite vast, there are various roles such as systems engineers, .NET/Java developers etc. If you could choose again, which role would you pursue and why?

Absolutely be a developer again, like to create from nothing. With a computer you can do almost everything. Still very interesting field for me. Would stay as a software engineer for sure.

14. In your opinion, what is the most useful skill set to know in IT? For example, SQL, JAVA Script etc.

Knowing a tech stack, Java or .NET is a must. I wouldn't emphasize a technology though. I think the most useful skill of a developer is the ability to adopt. And for that you have to know the general principles behind these technologies.

But most important is to have the Academic knowledge, the algorithms, mathematics, data structures. This is what you can build on. You need to know it really well. You need to know the design patterns, the patterns we use, they are programming language agnostics. Doesn't depend on programming language, structure and algorithms are the same. If you can learn .NET stack for example, and need to work in JAVA, you just need to learn a new language. Rules and algorithms are the same.

For example, a job looking for JAVA developer, but would consider a .NET developer. Not a problem, transition to another should be rather easy.

Of course, you should know a techstack, but having a general professional knowledge is much more important. A developer should be able to learn a new programming language in several weeks. (Ok, not to the professional level, but to a good level.)

But if I would need to name some technologies then I would say know a technology stack deeply and know some other languages at a lower level.

For example: for .NET stack you should speak C#, SQL (MSSQL dialect) and know how the .NET framework works. But you should have some knowledge of HTML, CSS, JavaScript, Typescript, Python, maybe ADA and some functional language. This way if you have some minor knowledge in these different style of languages at a new assignment where you have to move to for example JAVA it will be much easier because you will be in the possession of the 'general idea' or 'general knowledge' (what I have mentioned before) and will be easier to adapt to the new environment.

15. Lastly, is there any advice you would like to give beginners wanting to become successful in the IT field?

Yes. The most important things are:

[Learn, learn, learn!]

Learn a tech stack and keep eyes open.

I'm a .NET developer, and half a year ago I started to play with Python as I am interested in it. So, now I have general knowledge.

Learn the basics! And learn continuously. Subscribe to a site: Pluralsight, LinkedIn Learning, or Udemy. Find a good platform to study.

You don't use your academical knowledge about algorithms and or distributed systems? Keep your knowledge by watching courses about these topics of Pluralsight, LinkedIn Learning, Udemy or even on YouTube with the MIT algorithm courses!

[Be a geek!]

This profession is not a normal 9 to 5 work. It is a way of life. Be a geek! Like what you are doing!

[Learn to say no!]

We are always pressurized by the product side or the management. We are always told we are late. We are always pressurized to finish our current tasks before it can be done.

Learn to say no. For example, say, we can do this but this or that won't be ready, then the product will not be stable. Then product can choose what to decide to go with. Really difficult to learn to say NO, when it is coming from senior management.

IT Technologies

Blockchain and Cryptocurrency

What does it do?

As a means of introducing blockchain, cryptocurrency should be discussed to get a better idea why blockchain is created. A straightforward way to explain cryptocurrency is that is virtual currency (Blockgeeks, 2020). Cryptocurrency is an exchange medium that is created and stored in a blockchain using encryption technique. The backbone of cryptocurrency is that it relies on the concept of blockchain to securely transfer from one person to another without a middleman to verify or authenticate the product being transferred.

Blockchain is way to passing information from person A to B in an automated and secured fashion (Blockgeeks, 2020). Without the needs of another middleman to verify the authenticity of the money which takes time to be process. Blockchain is much quicker in processing and verifying the transfer. Where this would eliminate the needs of paying for transaction fees due to centralised bank to verify that it is real money. The idea of blockchain is that this would replace processes and business model. This eliminates business that makes a profit as a middleman (Blockgeeks, 2020) (BlockchainHub, 2020).

What is the state of art of this blockchain technology and cryptocurrency?

The state of the art of blockchain technology is was originally used for peer to peer electronic cash payment without the need of going to financial institute for verification (Blockgeeks, 2020). Solving the problem of trust system using digital signature as a part of solution to the problem. As well solve problem with double spending which is refereeing to unauthorised creation or copy of money (BlockchainHub, 2020).

What can blockchain and cryptocurrency do now?

For the blockchain and cryptocurrency can be accomplished because of the peer to peer (P2P) network topology. As well the participates computers act as nodes, running a program to process and verify the transaction between every node in the network that will approve the transaction whether it is valid. Once it is valid transaction the transfer of virtual money will be transferred to the to the other person. Without transfer fee charge.

What can Blockchain technology and cryptocurrency do in next 3 years?

The concepts of blockchain will be the one that will make an enormous difference in lowing cost, improving the efficient way of sharing information and data between open and confidential business networks. Where the blockchain concepts can be used as records of data about physical products that requires to be verify for authenticity and prevent fraud and counterfeits (Al-Saqaf and Seidler, 2017). For example, peer to peer payment (sharing economy), ID management, contracts, land titles (a deed in real estate title) etc. Other application of blockchain that can be implemented can be seen in Figure 1.

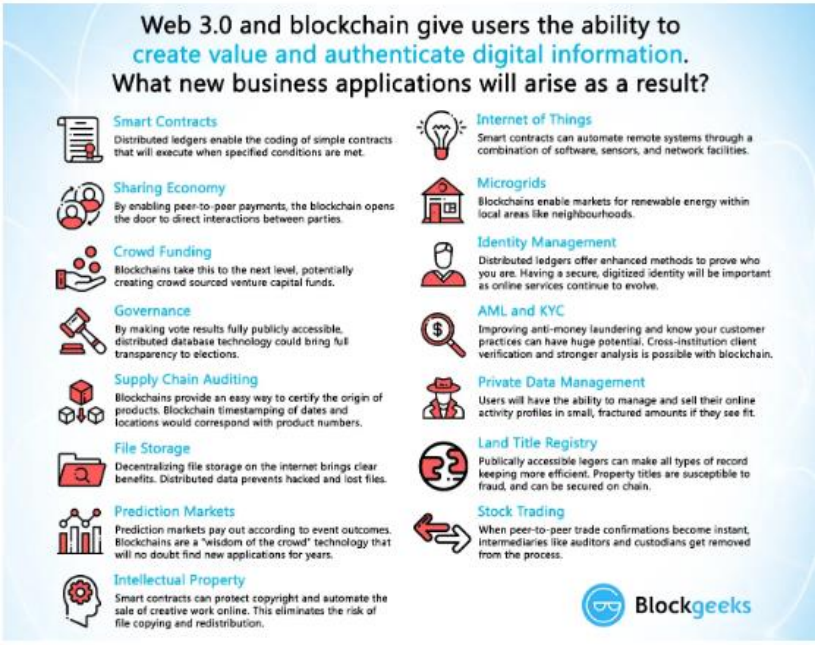

Figure 1. Application and uses of blockchain model concepts. Source: Blockchain Hub. (2020).

What technology or development make this technology possible?

The blockchain technology that will change the future as a concept that can branch out to other sectors rather than cryptocurrency only. Where it requires need for peer to peer (P2P) networking file sharing to verify authenticity (BlockchainHub, 2020) (Blockgeeks, 2020). Everyone on this P2P network can see everyone else's entries in near real-time. That makes it difficult for one user to gain control of the P2P network. This is what they called decentralised and not own by any company. The blockchain programming will make this technology to be implemented in a wide variety of application. Developing application using programming languages such as C++, Java, python, PHP etc.

What is the impact?

The blockchain technology would results in loss of jobs in low-skilled labour. Which would eliminate jobs that relies on intermediary companies such as banks, insurance, and giant social media business (Al-Saqaf and Seidler, 2017). Job loss would include people in stock trade as well, such as clearing house, auditors, and custodians etc (Blockgeeks. (2020).

This affects business that are the middleman that relies on transaction or subscription fee. For example, Apple or Spotify, Central banks (example Reserve bank of Australia-RBA) etc (Blockgeeks. (2020). To give more detail in some of the companies and distributors for music streamer relies on users to pay for subscription to listen to the music app.

How will this affect you?

Blockchain will change the financial world. In terms of stock exchange, loans and insurance contracted. Which will affect bank accounts. Every financial institute will go bankrupt or forced to change fundamental of safer ledger technology without transaction fees (Blockgeeks. 2020). The effect on online security for everyone would be affected as well. Where hackers will have a tough time committing cybercrimes online with this blockchain technology. Which would make people lives more secure online when a distributed system, (P2P) network would allow data storage in the cloud to be more robust and protected against attacks (Council, 2020).

In terms of IT professional and students entering IT field job requires to adapt to changes to this blockchain technology and cryptocurrency. Where they might be involves in this blockchain technology in their work. Which will force everyone, such as other business to adapt to blockchain technology model rather than the traditional business model. Where the demands of blockchain developer will increase in job demands due to this revolution blockchain technology (Blockgeeks. 2020).

Better communication that would be more secured than centralised platform. As well have better database system for healthcare. Where there will be no need for doctors to transfer information about the patients from one database to another (Council, 2020).

Cybersecurity

What does it do?

With the extraordinary development of the Internet these days, people have connected each other around the world. Furthermore, digital transformation has also changed the way that people work and live. So that we can easily send photos, collaborative work documents, group assignments or transfer money worldwide with just a simple click via a bank applicant right now.

Besides with so many advantages of the connected work right now, people still must face another threat called cybercrime. Over the past few decades, technology has become an increasingly integral aspect of the workplace. And, it is a key driver of economic growth, as it also brings about new security challenges. Every year, organisations lose billions of dollars to cybercrime – it is a huge loss and unsolved problem for many companies now. That is why cybersecurity is very important right now to fight cybercrime.

Cybersecurity is the practice of protecting organisation systems, networks, and programs from cyberattacks. These attacks are usually tried to access, change, destroy important information, extort money from organisation; or interrupt normal business activities to stop the growth of that organisation (What Is Cybersecurity?, 2020).

For successful protection from cyberattacks, a cybersecurity approach needs to have multiple layers of protection that cover across the organisation computers, networks, programs, or data that one intends to keep safe.

Technology is essential to give organizations and individuals the security tools needed to protect themselves from cyberattacks. There are three main things must be protected all the time: working devices like computers, smart devices, and routers, networks; and the cloud. And there are some common technology tools that used to protect these things over the past until now such as firewalls, DNS filtering, malware protection, antivirus software, and email security. Beside normal common technology tools, there are some the states of the art of cybersecurity methods such as moving target security, air gapping, cooperative cybersecurity, and next generation firewalls right now (Victories, 2020).

Moving target security - This method of security is used by numbers of leading companies to protect their organisation network systems. This method will mix up the names, references, and locations of files in the server's memory, and the application by itself to make it more complicated and more difficult for a malware to infect or detect a system. To make this method more powerful, so each time the computer is rebooted, all the names, references, and locations of the files in the server are re-mixed, to ensure that the system will have different configurations all the time.

Air gapping is the security method used for military defence or running nuclear generators. This method will isolate a system from both sides- the first side is local networks and the second side is the internet so that there is only one way the systems could get assessed is from someone getting physical access to the system itself. This is one of the most tough solutions now for keeping exceptionally important data that needs to be stored and protected with highly security.

Cooperative cybersecurity- Another new method is known as cooperative cybersecurity which means multiple organisations will work together to store each other's data as a data-sharing alliance. So that if cyberattack happens to steal important data from one organisation, the hackers need to access all the systems of the alliance. Unable to do this means hackers cannot do anything harmful to the important data. Statistically, the chance of successfully hacking for that kind of cyber defence is very low. And if hackers can do that, they need to find a way to unencrypt what they found.

Next generation firewalls - Normal firewalls are nothing new for all the users or organisations, however, a new next generation firewalls now exist that take system protection to the next level. The next generation firewall protects websites and web apps from virus, ransomware and malware infections while preventing intrusion from hackers and blocking distributed denial of service attacks. A next generation firewall is designed to keep offering high performance threat protection.

What is the impact?

Nowadays, sometimes we can read many shocking news about naked pictures of famous celebrities or private importation of users sold for marketing companies. They are happened quite often these days because hackers now have created many tools to get accessed into our systems such as computers, smartphone, routers or even our camera systems. And as we all know that we are living in the digital age, so that everything we do is always connected to the internet, including our social media, our communications, our entertainment, our online shopping, or online banking, and even our medical histories and prescriptions.

Especially social media flatforms such as Facebook, Instagram, or Twitter with millions of people using right now to share our experiences and pictures with our families and friends. Day by day our information will grow on the Internet such as our family backgrounds, our friend relationships, employer details, our bank accounts. And of course, we are not award of this information very important for cybercrimes using it to attack our systems.

With each convenience that technology has brought into our lives, the level of inconvenience has also been raised by making it easier for cybercrime to obtain our personal information and private records and it is hard for us to prevent our private things(What is Cyber Security and How Does It Affect You?, 2020). By seeing what the social media users does not, cybercrimes are rising nowadays by sending scams, faked receipts or withdrawing money from users' bank account. So, with the exist of cybersecurity these days, internet users will be safer and more protection when using world wide web.

Cybersecurity will protect our electronic data by preventing, detecting, and responding to any cyberattacks from cybercrimes. If all users and organisations equip themselves about cybersecurity, there will be no cybercrimes out there. Therefore, the organisations will not lose the money and no one will lose the job.

How will this affect you?

Before understanding much about cybersecurity, I just shared and posted whatever I wanted on my social media, even some personal information. But cybersecurity just changes the way I experience the Internet. Now I treat my personal information like my cash, so I do not leave my information lying around, I just share about them when I really need it by authorised people because cybercrimes can use certain combinations of anyone's personal information apply for credit cards and bank loans, or commit crimes.

Additionally, I do not leave my devices unattended anymore and I put more layers of security by adding passcode, fingerprints, and face recognition. And I protect my email and my mail from information breaching. Using antivirus for my computer and internet security will help me reduce the risk from cyberattacks, besides that I will tell my families and friends manage their social settings to keep their personal and private information locked down. Not only me changes the thought of cybersecurity but also my families are award of cybersecurity very extremely important for us right now. Now we need very careful about sharing my information online and secure our router as much as we can by not downloading any unauthorised programs or opening unknow attachments.

Clouds, Services and Servers

What does it do?

Clouds, services, servers provide us with an array of computer services ranging from software applications, data, networks for individuals or businesses. It provides the connection and access using technology through the internet to sustain, maintain, host, and share the use of data.

This technology is the preferred method to move away from individually physical hosted servers to cloud based which has many advantages such as:

- Pricing – pay as you go pricing model for businesses requiring services across servers, platforms, technology, data storage, etc. No need for any upfront costs or complexity to maintaining and owning their own infrastructure and reduces hardware costs.
- Stability – exceptionally reliable, scalable, and agile distribution systems
- Speed – Fast, increased broadband
- Security – Cybercrime and Cybersecurity is a major factor as this requires high cost to monitor. Cloud security sustainability through data protection and authentication, to maintain highest control and reduce risk.
- Saves time and resources – Increases productivity, flexible and reduction, less need of in-house IT staff

There are 3 main categories of cloud computing through the servers: (What is Cloud Computing?, 2020)

1. IaaS: "Infrastructure as a Service" which allows organizations to operate and maintain all their servers, network, infrastructure, data storage and operating systems, which is a complete solution to an organization's needs. This allows for growth an cater for developments and future requirements. Examples are Microsoft Azure and Amazon Web Services.
2. PaaS: "Platform as a Service" provides developers with cloud-based platforms to utilize to create customized software applications to store and build their creations. Examples are Heroku & Windows Azure
3. SaaS: "Software as a Service" are cloud based software that is available online on a subscription basis that does not require any downloads to your machine and can be shared collaboratively within your organization or within teams for ease of transparency and connection. Examples are GitHub, JIRA, and Dropbox.

Cloud adoption is the way going forward as you can see already in the stats below and increasing year by year. (The Cloud Market Keeps Moving Upwards, 2020)

Figure 2: Cloud market yearly progress. Source: Statista 2020

Businesses like healthcare, Fintech etc. are high adopters of cloud due to stricter regulations and compliance requirements to help mitigate against cyberthreats and sensitive information. It has become increasingly adopted in all industries, through public, private or a hybrid cloud environment.

Cloud computing today advanced to incorporate areas from artificial intelligence, predictive analytics, virtual software vs having physical hardware. In the future we will expect an increased and enhanced execution of AI algorithms continuous integration of processes, delivery, and utilization in open-source software. Big data and security will ever so evolve with new developments to keep up with advancements. In addition, cloud computing will develop to be more specialized, customizable, and automated for end user experience. Developments within block chain, artificial intelligence, R&D, robotics etc. all rely on cloud technology and will advance into the future.

What technological or other developments make this possible?

Storage/Data - Industry standards

A classification system is important to provide a consistent standard and therefore provides assurance and quick adoption.

Data Centers have 4 distinctive tiers that allow businesses to align their infrastructure needs for general operation and to sustain continual growth.

The American National Standards Institute (ANSI) and Telecommunications Industry Association (TIA) published standards for data centers and you can find the complete description on their websites. (What are data centers? How they work and how they are changing in size and scope, 2020)

What sets them apart are the features such as cooling, power, maintenance, and recovery in times of fault. This allows companies to comply to their organizations needs with compliance, security, and regulations. (What Is Colocation Data Center?, 2020)

- Tier 1: Basic Site Infrastructure has a single path of power and single distribution path.
- Tier 2: Redundant Capacity Component Site Infrastructure also has a single path for power and cooling with a few redundant and backup components.
- Tier 3: Concurrently Maintainable Site Infrastructure has multiple paths for power and cooling and systems with redundant capacity components and multiple independent distribution paths.
- Tier 4: Fault Tolerant Site Infrastructure is built to be completely fault tolerant and has redundancy capacity components for near all physical events. (About Data Centers, 2014)

Virtualization developments

This is the ability to run multiple operating systems on the same machine via virtualization. Allows you to do things such as run old systems, testing new software, etc. Whereby any issues that arise can be simply resolved by deleting the virtual environment as its contained. (Pros and cons of the virtual machines - How to access serial devices in VMs, 2020)

Benefits such as having the ability to get a snap shot of the database for backup, which is valuable for server maintenance. Also, having bandwidth across multiple VMs on your machine so it does not use up your main machine. Overall, saves money and resources, no physical space and cooling, access to technological architect not existing on your machine and saves on maintenance, provisioning, and recovery.

Servers, Software and Applications

The Market Leaders in hosting web-based applications such as Amazon Web Services (AWS), Microsoft Azure and Google Cloud platform pave the way advancements can make it possible to get the latest technology through software delivery. (The Cloud as an Innovation Platform for Software Development, 2020)

AWS provides services are comprehensive through storage, messaging, computing infrastructure, content management, on demand delivery technology services as pay as you go model. Infrastructure technology to emerging technologies.

Azure is a cloud service platform to deliver global network with the ability to choose preferred tools and frameworks. Apart from infrastructure computing services It can also utilize Microsoft applications such as online Windows and Office as well as Microsoft SQL Server, Microsoft CRM, .NET services, and SharePoint services. and allows for hybrid environments.

Google Cloud provides through delivery of computing systems and infrastructure networks, users can benefit the Google platforms such as digital assistant, google cloud SQL, storage etc.

There is a huge growth and competition as these firms deliver powerful software developments in their cloud platform market and continue to do so with cutting edge advancements in intelligence such as AI, AR, IoT etc. (AWS vs Azure vs Google Cloud, 2020)

What is the impact?

The impact is that servers increasingly will be on cloud and services executed through these channels simply because of the added benefits listed above. Hosting software applications in a web-based cloud environment has many advantages versus being held in a private physical server or software.

There 3 types of cloud computing environments – public, vs private to hybrid. Therefore, depending on your needs you do not have to go all public for example and host some applications or data stored through private physical servers. This gives the flexibility for firms in certain industries that have extra sensitive information that need this option.

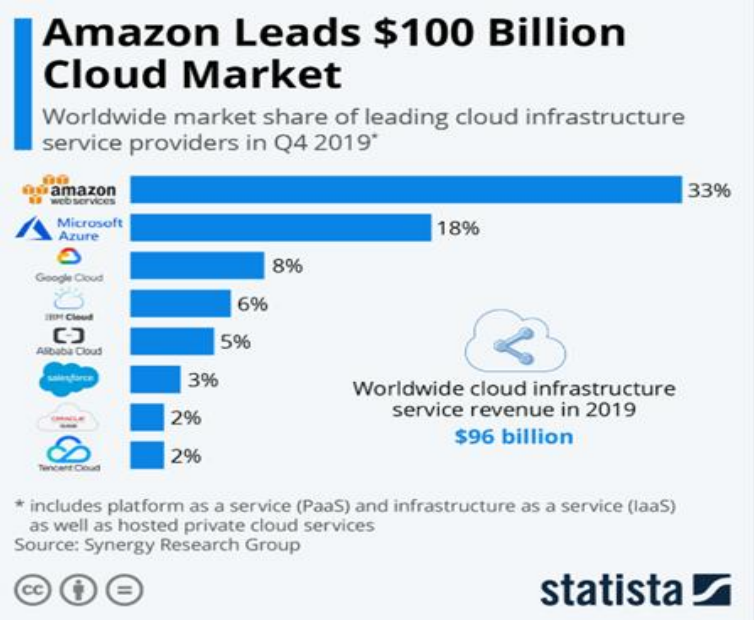

Figure 3: Market share of cloud infrastructure. Source: Statista 2020

Across the different providers you can see the top 3 uses of cloud solutions. (Amazon Leads $100 Billion Cloud Market, 2017) Amazon Web Services, Microsoft Azure and Google Cloud, take up most of the market share. Global cloud market growth to increase by 17% according to Gartner. (Gartner Forecasts Worldwide Public Cloud Revenue to Grow 17% in 2020, 2020)

I believe because of efficiencies saved, that means man power in teams may decrease across different industries simply because of the cost saving and resources with AI, Augmented Reality, and machine learning advancements such as online training videos which reduces face to face training, chatbot for queries and support. (How technological advancements are changing workplace training, 2020) Firms are increasingly adopting an online, non-personal method of interaction replacing the traditional methods of a decent sized customer service to sales team. We have already seen this adoption in education centers with online learning, AR in replicating surgeries for surgeons and even such things as Siri on the iPhone.

Reformation of how we use big data to automate and digitalize processes has changed the workforce with companies investing in individuals with data science, functional language, or technical skill sets. There has been an increasing need for the workforce to upskill to keep abreast of the technological advancements and to replace manual tasks to work smarter.

For the IT industry, we would see a shift to other skills sets to support the automation, predictive analytics, and digitalization of the software.

Below chart illustrates the growth rate in IT by segment. "Emerging tech" includes fields like IoT software, big data/analytics, AR/VR, etc., which is expected to see the most growth, with forecasts suggesting growth in the sector by 109 percent between 2017 and 2022. (Information technology (IT) industry growth rate forecast worldwide from 2017 to 2022, 2020)

Figure 4: Information technology industry growth forecast. Source: Statista 2020

How will this affect you?

In our daily lives, with clouds, services and servers advancing in technology and providing a wider range of services to the community we will see the impact in areas as below:

- AI advancements, access to storage of data etc. will be more customized and automated
- More choices by network providers
- Lower pricing packages use as you need model e.g. increase memory space etc.
- Online access anywhere for storage and backups, clouds for ease of use e.g. OneDrive, Drop Box
- Increased Security as Cybersecurity is increasingly important, banking apps etc.
- Enhanced user experience, ease of use
- Stability and Reliability
- Speed with quicker loading, streaming etc.
- Access to latest technologies, software etc.
- Gaming – scalable for gaming for streaming of big data
- Apps – accessibility to mobile friendly access and increased stability
- Connectivity to a software/hardware requiring use of big data and content
- Connectivity and sustainability for social media with the mass followers and subscribers

This has huge benefits and makes a difference for me as I will be able to use technology services hosted by powerful clouds and servers with the convenience and ease with minimal disruptions. I like the fact that everything is online and on a secure cloud, where I am assured everything is backed up. I believe AI, big data, automation will be advancing to make my everyday personal and work life customized to my preferences and change as per my usage needs.

This will equally impact my family and friends. We sometimes may not even realize we are experiencing advancements in some of these areas like in software, security etc. As our expectation standards are a lot higher than the past and its automatically part of the user experience. But we are influenced and exposed to the suggestive predictive analysis. For example, when we click on a picture, searching on a topic, any item or liking a social media post triggers related news and advertisements bringing in the commercialization aspect in this industry. Thus, understanding policies, usage and data collection is a focus as it affects our privacy.

Most work places also enforce education of cybersecurity, work place policies and practices with quizzes to make us aware of such dangers and what we should do in those situations and promote best practices. This is not only useful for work but in our everyday lives when accessing software technology over the internet or even just understanding storage of our private data. Communication is so easy these days with messenger apps, video calls, who makes calls to a physical phone anymore? It is almost all through the internet via online communication.

A recent example is of Zoom, an online video call conferencing cloud based (SaaS) system that took over the market share recently, even over Microsoft Teams and Skype. The simple extra features and usability made a difference, is because of items like beautified face features, easy to use, ability to change background etc. Beside the fact of privacy issues, that have surfaced, it has still become a popular choice in the market and kept a competitive edge for now.

Overall impact of society with cloud, services and servers includes advancements in computing services through innovation, creativity, flexibility. With recent events of COVID-19 affecting us all globally currently, it is an example of how important technology is. Clouds, services, and servers makes possible the delivery of these computing services. Increased internet usage across industries has seen a massive shift to online delivery of food, online purchases, entertainment and individuals and companies have needed to change the way they work and personal habits. The stability, bandwidth, agility, and scalability of service providers provide us the best technologies and advancements in the future.

Autonomous Vehicles

What does it do?

An autonomous vehicle is a type of vehicle that can operate without any human assistance (What is an Autonomous Car? – How Self-Driving Cars Work | Synopsys, 2020). They can drive through busy street and along highways without the need of a human to take control of the vehicle at any time. Autonomous vehicles also can sense its surrounding environment which helps the vehicle to predict and react to traffic conditions. This allows the vehicle to do things such as change lanes or swerve the vehicle to avoid a collision.

Currently there a six levels of driving automation ranging from fully manual to fully autonomous which is defined by the Society of Automotive Engineers (SAE) (J3016B: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles - SAE International, 2020). This classification is based on the amount of human interaction and attentiveness required in operating the vehicle rather than the vehicle's capabilities. These are the current levels of driving automaton as defined by the Society of Automotive Engineers are (SAE International, 2016) (The 6 Levels of Vehicle Autonomy Explained | Synopsys Automotive, 2020):

- **Level 0 (No Driving Automation) -** All driving actions are performed by the driver. The vehicle may contain systems that aid the driver, but these systems are not considered autonomous as they do not drive the vehicle such as emergency braking system (EBS).
- **Level 1 (Driver Assistance) -** The driver completes most aspects of driving but has assistance from an automated system that shares control of the vehicle. Driver assistance systems at level 1 automation include cruise control and parking assist.
- **Level 2 (Partial Driving Automation) -** The automated system can take full control of a vehicles functions (accelerating, braking, and steering) however the driver must monitor the system and be prepared to regain control of the vehicle.
- **Level 3 (Conditional Driving Automation) -** All aspects of driving are automated, but a driver must still be prepared to regain control of the vehicle. At level 3 automation vehicles can make informed decisions by themselves such as accelerating past a slow-moving vehicle and emergency braking.
- **Level 4 (High Driving Automation) -** The vehicle is fully autonomously and does not require any human interaction or attention for safety reasons but still has the option to manually override.
- **Level 5 (Full Driving Automation) -** The vehicle is fully autonomous and does not require any human interaction or attention at all. At level 5 autonomation vehicles will not require any controls (steering wheel and accelerator/brake pedal) whatsoever.

Currently car manufacturers are able to achieve a level three classification in autonomous driving as defined by the SAE. This means that cars with a level three classification can drive themselves however a driver must still be attentive and prepared to regain control of the vehicle. At this level a vehicle can accelerate, brake, change lanes, park itself, sense the surrounding environment of any potential dangers and avoid a collision. Some manufactures have been able to achieve a level four classification in autonomous driving but only under specific circumstances along pre-defined routes (The Current State of Autonomous Vehicles, 2020). No vehicle currently sold to the general public has a level four classification.

The biggest technological innovation that have allowed autonomous vehicles to progress and perform at its current state has been the rapid and continual development of artificial intelligence and machine learning. In combination with on board sensors such as LIDAR and cameras in the vehicle, companies have been able to use the data gathered from their fleet of vehicles to construct and test in a simulated environment (The Current State of Autonomous Vehicles, 2020). By testing in a simulated environment these simulations are able to map in great detail routes, intersections and surrounding environment from which the artificial intelligence and machine learning on board vehicles can learn and improve its decision making.

What is the impact?

The potential impact of autonomous vehicles will have a significant impact on society and a wide range of industries around the world. This technology has the potential to positively impact the word by reducing congestion which also reduce energy consumption and by improving safety on roads (Anderson et al, 2014). With autonomous vehicles in operation, it will be able to reduce congestion and improve traffic flow thus vehicles will be more fuel efficient and potentially output less energy into the environment (Julia Pyper, 2020).

More importantly with a fully developed vehicle automation system it can significantly reduce the amount of deaths, injuries and accidents that are happening on roads today. Accidents involving human error such as speeding, tailgating and drink driving would now be a thing of the past (Zhang, 2020). It is estimated that autonomous vehicles could "eliminate 90% of all auto accidents in the United States, prevent up to US$190 billion in damages and health-costs annually and save thousands of lives” (Ramsey, 2020).

While many positive can be gained, the widespread introduction of vehicle autonomation could potentially have a negative knock on effect in other industries. The biggest industry that will be impacted by the introduction of vehicle autonomation will be the transport industry. Significant job losses will occur around the world as the position of a professional driver such as taxis, buses and trucks are made redundant (Mui, 2020). Additionally, vehicle repair shops will suffer a significant income loss as vehicle autonomation will significantly improve road safety leading to less accidents involving vehicles.

How will this affect you?

With the introduction of autonomous vehicles into the world it has the potential to provide me a more reliable, healthy, and safer mode of transport. If the autonomous technology ever reaches a level 5 classification, it will mean that I am more likely to reach my destination on time without any delays. There would be less congestion on roads making it more environmentally healthy for me, my family and the world. As a result, less time would be spent on travel which will give me back more time in the day that I can use to spend more time with family and friends. Also, streets will be a lot safer as there will be a lot less accidents involving vehicles as the human error factor when driving is now taken away.

On the other hand, if someday autonomous vehicles were to take over the world it could have unintended consequences. An autonomous vehicle would be entirely controlled by computer hardware and software thus security would be a massive concern. A person with malicious intent could potentially find and exploit flaws in the security system of vehicles that could result in them taking full control of a vehicle or much worse using it as a weapon that could cause other vehicles to crash purposefully. If at any point a situation like this were to occur, it would cause a massive disruption to the transport system as it would grind to a halt and it would strike a lot of fear and concern amongst people including myself moving forward with the technology. With that being said, I do believe overall the introduction of autonomous vehicles will have a positive impact on the world and in society, but a cautious approach should be taken with such important technology.

Project Idea – Web App Garage Door Opener

Overview

The combined project idea that the team, Omega Ruby, produced is an expansion on Darren's initial project from assignment 1. In this project, the team will look to build a web app that remotely opens and closes a garage door by controlling a web-enabled Raspberry Pi. As well as this basic feature, it will have a camera to make sure that living things are not crushed by the garage door if the door was to be closed remotely. The web app could also alert the owner if the garage door were open too long as well. We also hope to integrate weather data into this app as well. While the smart garage door openers already exist in the marketplace, we believe that the changes and additions that we propose would improve on what is available and therefore be sufficiently innovative.

Motivation

The original motivation for the project on Darren's behalf was based around his tendency to accidently leave the garage door at his home open for long periods of time – sometimes even overnight. As garages frequently contain valuable items (such as power tools, gardening equipment, sports equipment, bicycles etc), this is obviously a security risk. After some investigation, it was found that while several Internet-of-Things garage door openers exist, many of them are quite expensive, while a Raspberry Pi and the required wiring, sensors and cameras can be obtained for far cheaper. Combined with the possibility of this being a driving force for learning further IT skills, it was believed that this would be a worthwhile and potentially completable project considering the skillset of the team members at the being of the assignment.

After discussion among the team, it was decided that several other features could potentially be included in any app developed. Firstly, a camera or other mechanism to stop the door closing inappropriately or if items are in the way was suggested as a safely feature after one team member recalled hearing of an incident involving a small dog being injured by a remotely closing garage door. The second feature suggested was to potentially feature weather information as this is always handy and could affect a person's decision to close an open garage door, and the third potentially being fuel price data as it is a motoring related topic.

Description

The teams project idea is a web app that runs Spring Boot framework as the team have only have some exposure to java programming. Where Spring Boot is a java-based framework that easy to create a stand-alone and production ready application (Spring Boot Tutorial - Tutorialspoint, 2020). The group will get involved in the project with the help of using the tutorialpoint.com which provided a very good documentation on using spring boot framework. As well using LinkedIn learning to help develop the web app using the spring boot framework.

The Raspberry Pi will act as a web server for the user which allows one to remotely control the garage door, and will connect to a home network via a WiFi dongle. There will be a relay module to connect to the Raspberry Pi and the garage door. As most garage door openers contain a fairly simple electrical circuit whereby pressing a button closes the circuit and allows the door to open, this relay module will allow the Raspberry Pi to control the garage door in place of a button needing to be physically pressed.

The planned integration of weather information for our app will hopefully be sourced from the API provided by the Bureau of Meteorology (H Sparks et al., 2017), with the similar fuel price feature sourced from a relevant API. Given the relative inexperience of our group, we will need to do further research in order to implement these features, possibly by learning using tutorials from LinkedIn Learning to apply to the spring boot framework app to this situation.

The safety feature described earlier will be implemented using a camera or sensor which when combined with software such as TensorFlow to stop the garage door from closing on a living creature or children etc. We are still looking for alternative safety features that will improve the garage door opener web app.

Tools and Technologies

- Raspberry Pi - this will act as the control unit and as a web server for the web app
- Edimax EW-7811Un USB Wi-Fi N Dongle or another Wi-Fi dongle that compatible with Raspberry Pi
- Magnet switch – this determines whether garage door is open or closed.
- SainSmart Relay Module – which allows control of the garage door
- Resistors
- And wiring of choice

Skills Required

- Some knowledge in Java and possibly Python programming languages.
- Understanding or willing to learn html and CSS language.
- Able to go thought the Command line on windows and navigate to project folder.
- Willing to learn how to wire a cable to the relay module.

Group Reflection

Van Nguyen

Was uneasy for couple of days before the group was assemble at the end of week 5. However, turn out great at the end of the report writing. However, was very awkward at first. But a simple introduction of each other made it a little easier for the team to get to know each other.

Communication on slack made life easier without the need of minutes taking. Working individual did seem to follow the same idea of each other. For example, structure of report is different in the Information technologies. As it can be seen in the contents page. Round robin did not work as I thought, it was very easy and relax way of communicating via slack. The other part that worked willing well is allow each member to take part in the editing of the report. Which shows that it was a team effort. Which I am proud to be part of this team for next following assignment in Introduction to information technology.

Minh Hau Truong

All team members always went online on time and contributed many ideas for the group assignment. And we respected and valued all ideas. After that, we discussed about those ideas to choose the good one and we divided the works for each team member. Although OMEGA RUBY Team was formed late, it did not mean that we lacked preparation of teamwork. I was surprised because after the first meeting on Slack the team showed that they took things very seriously to finish the group assignment with good grade. The team did think about the upcoming assignments to prepare by discussing carefully about the IT project of this assignment. Besides that, I have learned a lot of things from my team members like they always help each other task by suggesting ideas or sending some useful links. And the most important thing that will make our group work well for a long term is no conflict in the team right now. Besides that, since lack time of understand each other so we still have some weaknesses in the team. But I strongly believe that our team – OMEGA RUBY will get better day by day and finish all assignments with good grades.

Sisi Liu

Communication was good and the team all contributed to ideas. We all delivered our parts within the required deadline. I believe the parts were divided as well as it could be considering the numbers in the team. Time was well controlled in the meeting and was constructive during the time. The team was responsive to each other's comments and we all participated. It would be good to have more time to review and edit, so that we could be more detailed.

Most of us had limited IT skills but we were all able to put our heads together to decide on the project idea taking in ideas from A1. It worked out well and we all agreed on what features to enhance on the original idea.

I have learned deciding and moving forward was key. I found getting the work done was easy to do if we all knew what to do. With set topics and questions, that was easy to divide up the work. The project idea section was the most difficult to pin down and took us the longest to confirm. Therefore, listening, giving feedback, and participating in a team is very important especially as it will decide our overall team score. We did an excellent job of that and will continue for our A3 assignment.

Darren Miral

Initially I was quite apprehensive about the group for three main reasons. Firstly, because it was formed late by people that had not been able to find a group within their own class. Secondly, because it was made up of people not in my class, I was unable to ascertain prior to joining whether the others were active members of the subject, and thirdly, because group work in university is notorious for potentially being difficult. However, after the first meeting of the group on Slack many of my concerns were allayed as the group appeared engaged, had a similar plan to attack the assignment and it was not too difficult to delegate tasks evenly. The fact that nobody had to be coaxed into a leadership position to make decisions for the group was also a plus. As a group we did have a significant amount of trouble devising a group project to undertake for A3, but it was well handled by all. After reviewing the work contributed by the rest of the team, I am confident that this group can and will work well for the rest of the study period as required.

Malcolm Tsang

The team has worked well as a group despite the group coming together late with little time to organize, assign roles and complete all tasks required. This no doubt is something that will be ideally improved upon moving forward as we get a better understanding of working with each other and with more time to prepare and plan accordingly.

Communicating with other team members have been easy and straight forward because of conducting regular team meetings via Slack. Through Slack the team was able to promptly organize and assign tasks to be completed by team members and be kept up to date on their progress.

It was surprising to see how well this team worked together in such a brief period of time. The team recognized the importance of getting organized quickly taking upon themselves to take initiative and responsibility by volunteering and assigning for tasks that needed to be completed. As a result, all tasks were completed on time set by the group which allowed more than adequate time for the team to prepare the final report. It was also nice to see team members providing support for one another with any issues or troubles they were having.

Whole Group Reflection

What went well?

Each team members feedback was consistent on what we thought went well, which is great to see that we all felt the same. We all agreed that communication and delegation of tasks was easy and straight forward. Despite the fact our group was formed late we were all engaged and delivered the tasks by the due date or close to. We communicated via Slack, where all team members were prompt in joining on time and provided many ideas and shared relevant links for the task at hand. All team members were responsive, responsible, and friendly which made it easy to communicate. Overall, we believe that this can only get better going forward into our next assignment 3, as we all have a good understanding of each other, our strengths and our abilities.

What could be improved?

We all commented on despite the fact the team was formed quite late, that we were able to complete A2 with aggressive timelines. Therefore, an area which we could improve on is having more time to review and provide constructive feedback on each other's work for an even better outcome. As we have already established the team and the project idea, we should be in a good position to push through on assignment 3 with a good, comfortable time line.

At least one thing that was surprising

Surprisingly, members took the initiative to volunteer to do certain tasks without absolutely no delegation required. Once we had to decide what work needed to be delegated. Each team member proactively took on certain sections, which meant we were very swift in making decisions and moving on to deadlines which everyone agreed upon. The fact that we didn't need to have an appointed leader position to do this illustrates that we worked well as a team.

At least one thing that you have learned about groups

Collectively as a group we have learnt that participation and decision making is key to having good team dynamics. Because of the good communication we had, we were able to openly share our feedback and help each other out. It was good to see everyone commenting on great work, praise and even other alternate solutions that would work better. Especially, at the end of the project in completing and overlooking the final version required a lot of communication and we all contributed and helped each other. Overall, having that consistent input from each team member is vital and the ability to make decisions and agree upon them contribute to great team work which makes this enjoyable and rewarding for all.

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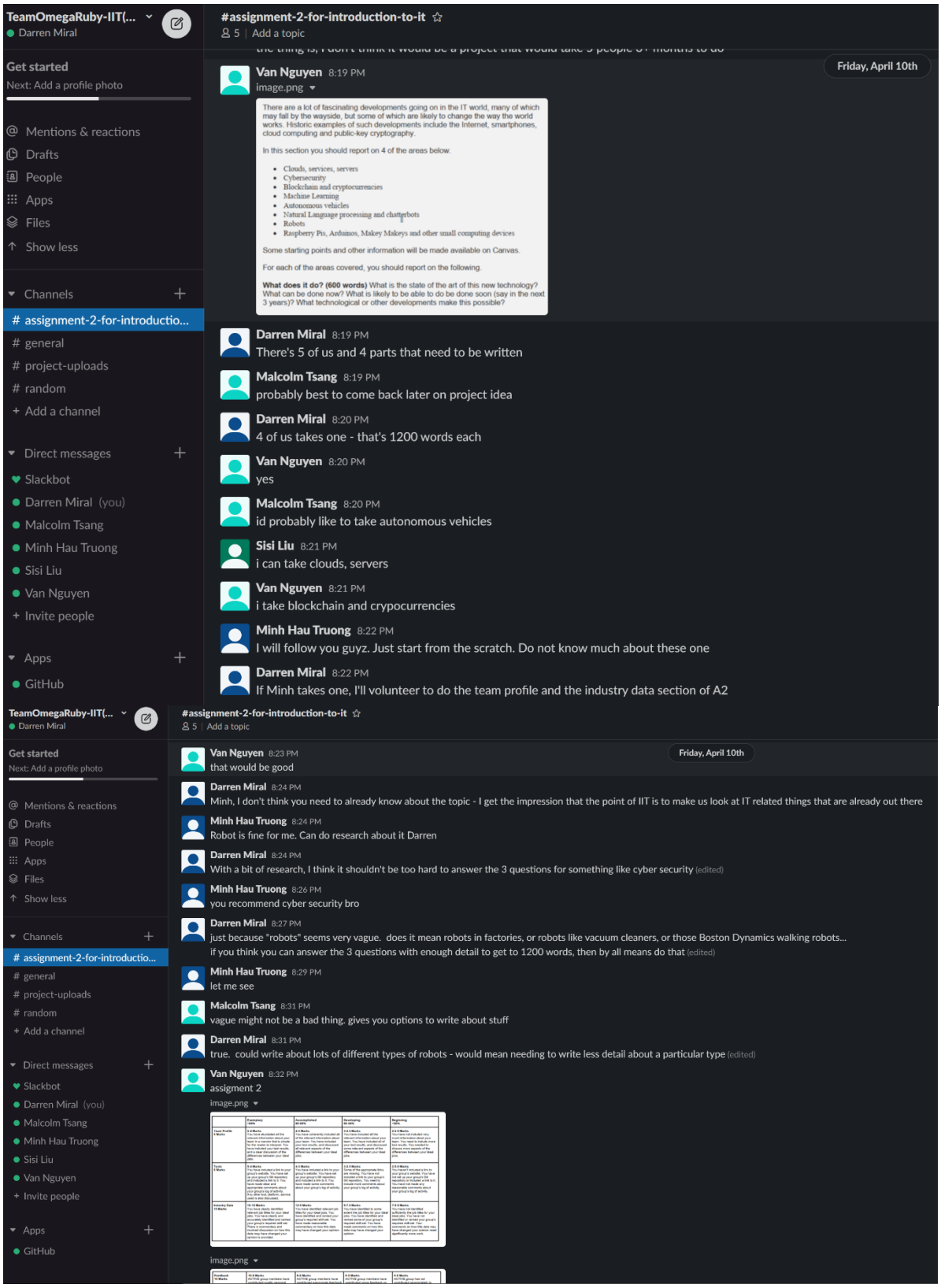
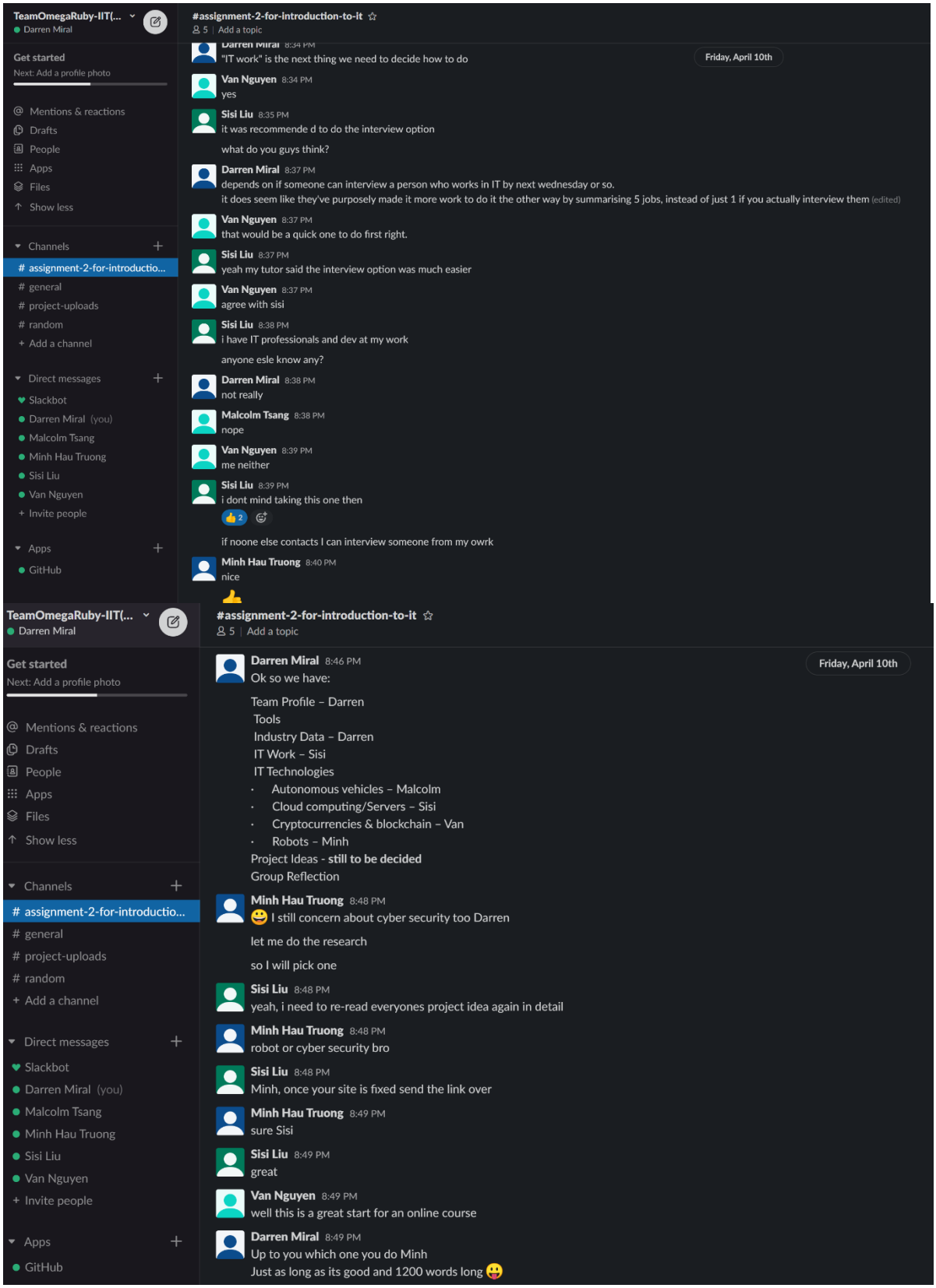
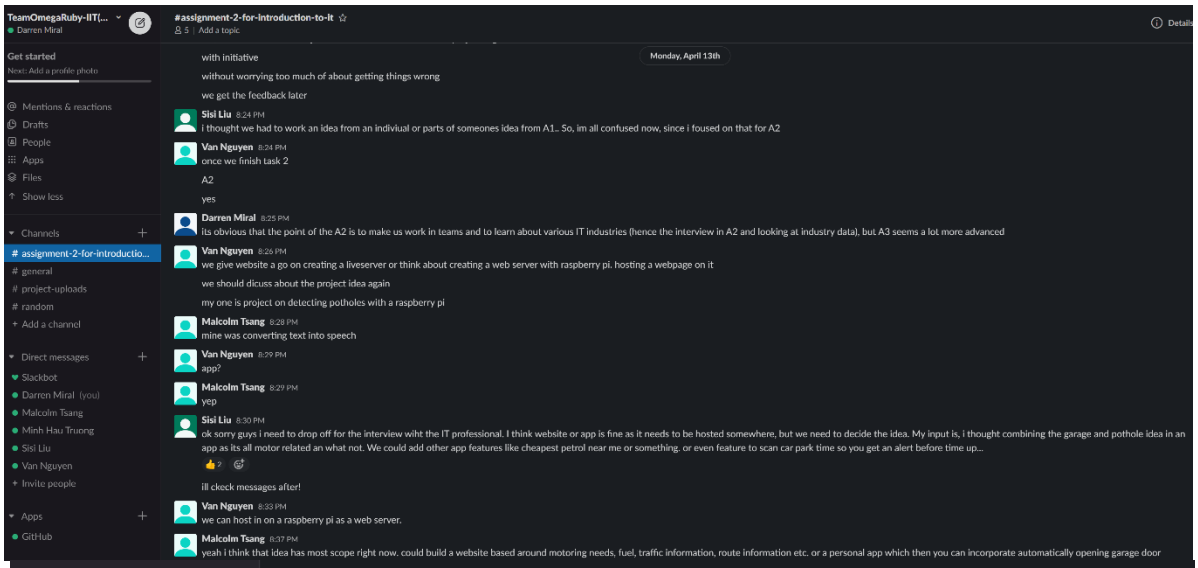
Appendix

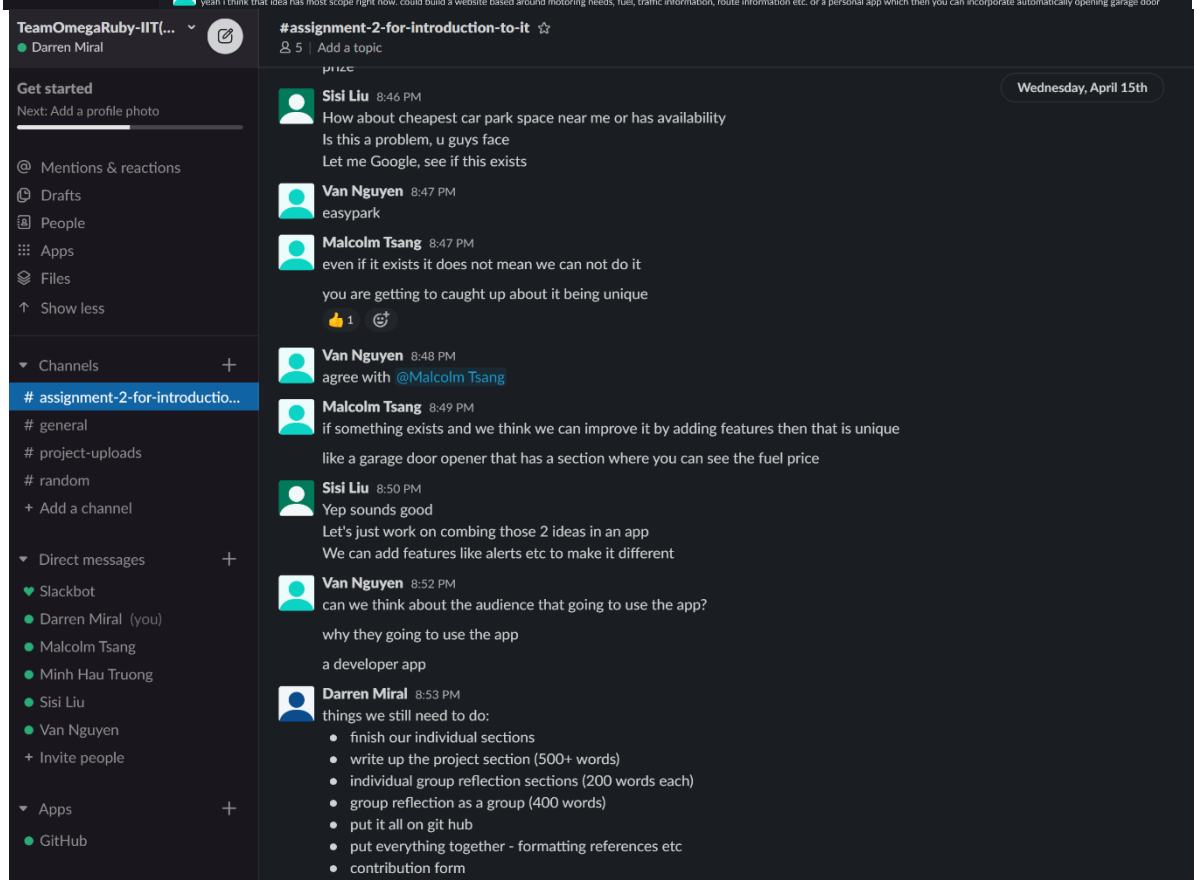
Appendix 1- First meeting 10th April



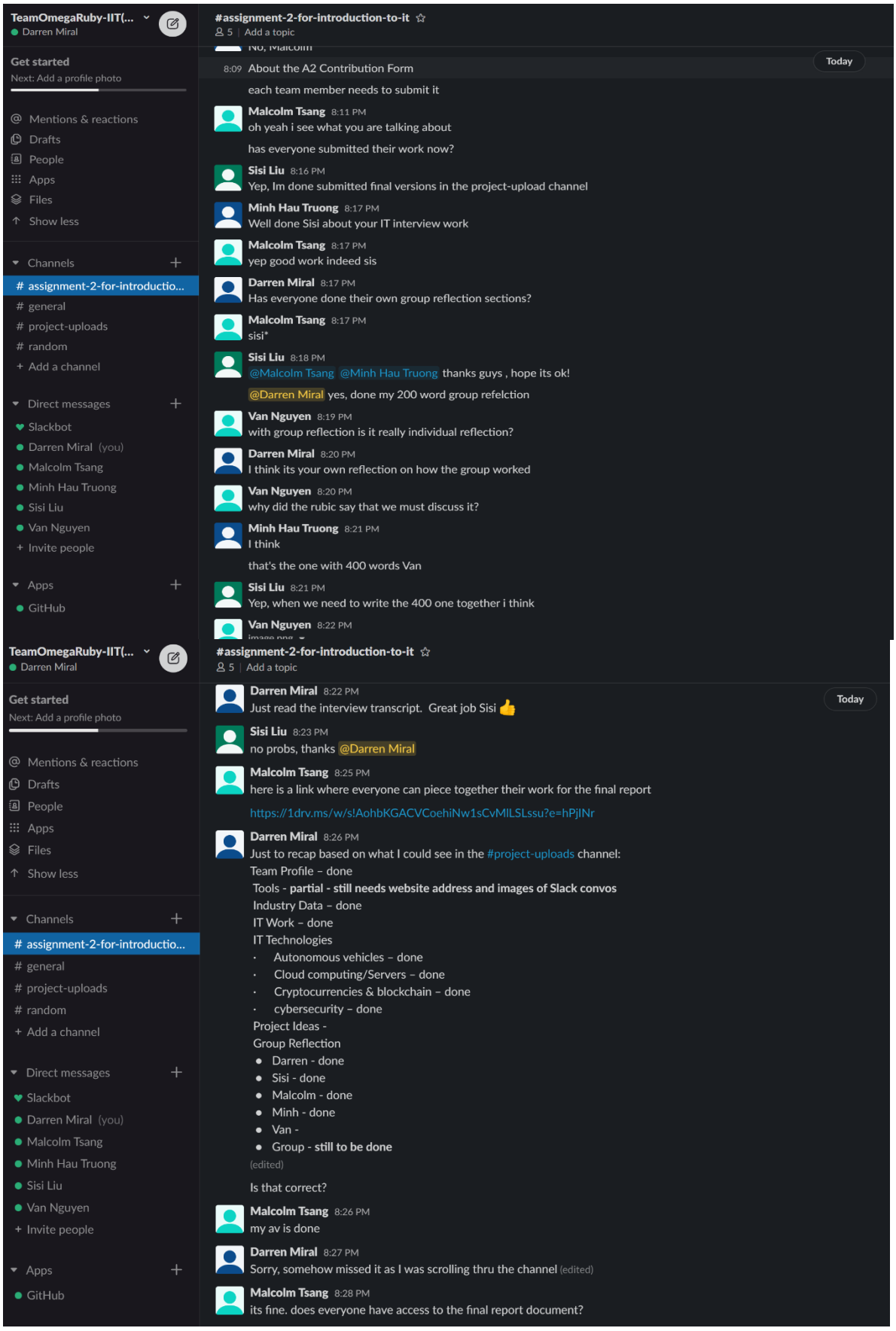

TeamOmegaRuby-IIT(...
Darren Miral
Get started
Next: Add a profile photo
Mentions & reactions
Drafts
People
Apps
Files
Show less
Channels
assignment-2-for-introductio...
general
project-uploads
random
+ Add a channel
Direct messages
Slackbot
Darren Miral (you)
Malcolm Tsang
Minh Hau Truong
Sisi Liu
Van Nguyen
+ Invite people
Apps
GitHub
#assignment-2-for-introduction-to-it
5 | Add a topic
Friday, April 10th
"IT work" is the next thing we need to decide how to do
Van Nguyen 8:34 PM
yes
Sisi Liu 8:35 PM
it was recommende d to do the interview option
what do you guys think?
Darren Miral 8:37 PM
depends on if someone can interview a person who works in IT by next wednesday or so.
it does seem like they've purposely made it more work to do it the other way by summarising 5 jobs, instead of just 1 if you actually interview them (edited)
Van Nguyen 8:37 PM
that would be a quick one to do first right.
Sisi Liu 8:37 PM
yeah my tutor said the interview option was much easier
Van Nguyen 8:37 PM
agree with sisi
Sisi Liu 8:38 PM
i have IT professionals and dev at my work
anyone esle know any?
Darren Miral 8:38 PM
not really
Malcolm Tsang 8:38 PM
nope
Van Nguyen 8:39 PM
me neither
Sisi Liu 8:39 PM
i dont mind taking this one then
2
if noone else contacts I can interview someone from my owrk
Minh Hau Truong 8:40 PM
nice
TeamOmegaRuby-IIT(...
Darren Miral
Get started
Next: Add a profile photo
Mentions & reactions
Drafts
People
Apps
Files
Show less
Channels
assignment-2-for-introductio...
general
project-uploads
random
+ Add a channel
Direct messages
Slackbot
Darren Miral (you)
Malcolm Tsang
Minh Hau Truong
Sisi Liu
Van Nguyen
+ Invite people
Apps
GitHub
#assignment-2-for-introduction-to-it
5 | Add a topic
Friday, April 10th
Darren Miral 8:46 PM
Ok so we have:
Team Profile – Darren
Tools
Industry Data – Darren
IT Work – Sisi
IT Technologies
Autonomous vehicles – Malcolm
Cloud computing/Servers – Sisi
Cryptocurrencies & blockchain – Van
Robots – Minh
Project Ideas - still to be decided
Group Reflection
Minh Hau Truong 8:48 PM
I still concern about cyber security too Darren
let me do the research
so I will pick one
Sisi Liu 8:48 PM
yeah, i need to re-read everyones project idea again in detail
Minh Hau Truong 8:48 PM
robot or cyber security bro
Sisi Liu 8:48 PM
Minh, once your site is fixed send the link over
Minh Hau Truong 8:49 PM
sure Sisi
Sisi Liu 8:49 PM
great
Van Nguyen 8:49 PM
well this is a great start for an online course
Darren Miral 8:49 PM
Up to you which one you do Minh
Just as long as its good and 1200 words long

Appendix 2 – Meetings on 13th and 15th April





Appendix 3 – Meeting on 17th April



Appendix 4 – Screenshot of individual project uploads