**Assessment 2**

Group 25

5 Squared

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Industry Data

**An interview with an IT Professional**

For this interview, I interviewed a long-time friend of mine that has been in his industry for 10 years now. He started in the Australian Defence Force and eventually went on to work for a company that contracts support through to the ADF.

**Name:** Matthew

**What do you do for work?**

Applications Analyst

I support a whole range of different software products, the main system is SharePoint which is a document collaboration tool. Which companies can use to collaborate on documents, similar to Nextcloud. I support the programs use within the company and help with development or customised solutions.

For example, we might have a customer that needs to complete a specific task. So, I will work with the customer and develop a custom solution. Afterwards I would then run in it an enclosed environment to see if it works on our system and the implement it assuming all has gone well.

**What type of tasks to you complete each day?**

We work on a rotation, so one day we will look at the call stack. This is where our clients will raise tickets, you’ll check the queue and assign some tickets to yourself. You’ll work through those tickets and liaise with the customers to ensure everything is functioning as it’s meant to be. Once you resolve a ticket you move onto the next in the queue.

If not on call stack then we do some project work, this might include updating servers, or other tasks that are directly related to servicing the clients. Maintenance and software upgrades for example. At the moment we are upgrading to a newer version of SharePoint so we are going through and doing an analysis against the current SharePoint system to see what we need to change to make it compatible with the new version.

**How did you get into your position?**

I entered the Australian Defence Force through the army, I was specialising in the communications field. Eventually I became involved in a defence project which was related to SharePoint, I was deployed overseas to work on the software and hardware on site. While I was doing this, I ended up working with the company that was contracted to help support the system we were using. They approached me and when my service with the ADF finished I eventually went on to work directly for that company which still contracts support to the defence force.

**What kind of people do you interact with? Clients, customers etc**

I work with all stake-holders, we have a meeting each day with my peers and workout the direction for each day. We will talk with the product owner and work with the team that uses the share-point software. I also may have to deal with Microsoft or other vendors of software that we use.

**Where do you spend most of your time?**

I work from home these days and log into a system using a VPN that allows me to work as though I’m at the office. My role is support and software maintenance so everything can be done from the laptop provided by the company. Occasionally I will need to make a trip to the office as I am on call.

**What aspect of your position do you find most challenging?**

Probably dealing with old products that are no longer actively developed by vendors. We may have some old software that is still needed for a business function, but it’s no longer actively developed so it becomes difficult if we ever need to troubleshoot it or integrate it into to new hardware and software. In some cases, we may even need to investigate the code and try patch things ourselves to create a custom solution. The software may have been discontinued, or the company has paid a lot of money for it and they aren’t ready to upgrade it. This can happen as soon as 4 or 5 years into its lifecycle, so it can become a common problem.

**Would you change your career path if you could or are you happy with where you are?**

I would have always liked to move more in to a software development path. My career has taken me to a point where its more software support than development. Having said that I am happy with where I am as I still get to work with some development. I have learnt where my strengths are taking this path though, I’ve learned that I can pick up new products and software packages very quickly.

I’ve just accepted a new role in which I will work as a stack technology consultant, this allows me to look at an entire system of software as opposed to specific software. I’ve learnt many skills which have shaped and refined over my career so far. I wouldn’t really change anything, but I’ve learned where I want to slowly move my career over time.

**Do you do anything outside of your daily job to further your skills into your chosen career path?**

One thing I’ve done is setup a lab in my home using enterprise grade gear. I use this to learn the hardware we use at my job, I also setup virtual environments to install software and test out functions and modifications before implementing them at work.

As a side project I use this hardware, to practice skills in other areas that aren’t related to my job such as other programming tasks and hosting gaming servers.

**It Technologies**

**Christopher Crawford:** *Clouds, services, servers*

I work as Level 2 support engineer for a private medical company. The company’s IT infrastructure works on a client-server architecture. I provide extensive support for both client software/machines and servers. Servers provide many different functions in a workplace and certainly mine. Our company has medical clinics all over Australia and this means servers all over Australia.

Servers provide many different functions within our company and are essential to the running of the company. My company hosts domain controller, email, print, file, SQL, application, web, media and back-up servers. In each clinic there is only 2 actual physical servers with multiple hard disks in each server. These are virtual hosts with the appropriate Operating System for the role of the virtual server. There are also servers that are centrally hosted which are used to host virtual machines/desktops. These virtual machines are then assigned to users and the machines appears as normal desktops to the user without expensive hardware.

Services/Applications that are hosted on these servers are as varied as the roles of the servers themselves. Some of these services/applications can be like Active Directory (domain controller) which allows for user management and security for user groups, software deployment and other group policies can be managed from this service. Specific business applications hosted on a server for use at client level. For example, there is a medical application that is used by Doctors to log patient data. This application has a simple GUI and is linked to the SQL server. This server is then backed up every 15 minutes to a specific back-up server on-site. This data is also replicated off-site to another cloud-based company who hosts the replicated data. This medical application is also linked to the print server and this allows doctors to print medical data from the application. I am just using this application as an example to show the close relationship between server and application/services.

Working for Medical company means that a lot of services are hosted on-site to protect medical data. However, the company does use Microsoft Office 365 both for software deployment and for cloud-based storage through One drive. This means that software does not have to be hosted onsite and taking up unnecessary space. One Drive also gives the ability to access data from any location without having to VPN into a work network. Cloud-based storage also eases storage issues with on-site servers. I would like to give more insight into cloud-based applications, but I do not support or work with cloud-based applications. I would imagine though that most business in the next 5 years or already have moved to cloud-based services.

I would say that in 3 years virtualisation is going to the replace most business IT hardware. Currently at my workplace there is a huge VDI (Virtual Desktop Infrastructure) project to replace clinics hardware with Thin clients. A Thin Client is a very basic computer optimised for remote connection to a client-server environment. Advantages of VDI are far cheaper hardware, no-onsite servers, greater data protection, better security and less pressure on LAN networks. Disadvantages of VDI reliant on a good and fast internet connection, sometimes hardware can be easier to break, and network outages are very problematic. The current issue for the company is the replacement of hardware and poor internet connection around Australia.

The likely impact of virtualisation for business is the ease and the exchange of data. On-site IT services and hardware will eventually become scarcer due to virtualisation and the difficulty of troubleshooting remote equipment. As a support engineer there is sometimes limitations on remote support and requires on-site support. The issue with on-site support is that it is not easy to co-ordinate with the client and will affect ‘business as usual’ for the company. Virtualisation makes troubleshooting easier as it is far easier to breakdown where the possible source of the problems maybe residing. As everything is hosted centrally it makes communication between IT teams easier for maintenance and incidents.

People most affected are obviously those using the services day-to-day and those that support and implement the technology. In terms of big impact, it changes the dynamic of the IT industry and the way it is supported and delivered. For example, it is far easier to monitor a virtual machine and its health in comparison to a desktop. A desktop/Laptops requires constant updates, hard disk fail, different types of hardware require different types of drivers. These are the drawbacks of desktops/laptops and in my opinion will likely be made redundant or replaced in businesses.

As I am at the beginning of this huge VDI project for my company it does it affect me personally. It means that I will be apart of the implementation and support of this change over. This means in my personal life that I will be studying and trying to understand how the technology functions to provide the best support I can for the technology. As this technology expands within the company this could potential mean I come closer to my dream job System/Engineer Administrator. The major difference in my life will be that I will be part of technology that is setting the way for businesses in the future.

Currently, it affects the time I spend with my wife because I am doing a lot over time to implement the VDI project. It also means that similar technology could be used where my family or friends work, and I hope it something that I will be an expert in the future.

**Mathew Ormay:** *Clouds, services, servers*

Natural language recognition is used to recognise what a person says and translate it into something a computer can understand. These systems typically use complex artificial intelligence (A.I.) to determine the meaning of a sentence. The reason artificial intelligence is used is explained well through the example given by Seif (2018). “Steph Curry was on fire last nice. He totally destroyed the other team” how a person and a computer may interpret that statement may be very different. While we as people may understand that the player Steph played very well and probably won against the other team. A computer may take this quite literally and think that Steph was burning and, whilst burning, he destroyed the other team so that they no longer exist. This is the issue that natural language processing aims to fix.

Currently language processing is available in many products, the most common being a smartphone’s assistant. These work in tandem with voice recognition software and typically wait passively in the background for a keyword to be said before a request or question can be asked of the assistant. The A.I. will then attempt to carry out the users request and give them a result. Chatbots are a text-based machines that attempt to have conversations with people and have been around since the 1960’s. Some call centres are replacing people with these systems for basic calls, for example reporting income through Centrelink, saving money on wages in the process.

Last year in 2018 Google unveiled ‘Duplex’ which can call businesses and make appointments on behalf of a user. What made this demonstration impressive the ability of the A.I. to understand contextual information and ask questions about whether the restaurant would be busy around the booking time, although it did seem to have some trouble in this example. Or if the desired time was not available it would ask what other time an appointment might be able to be made. As evidenced by this presentation this technology is already quite advanced. The future of these systems is further refinement of it’s understanding of people’s speech in given contexts, leading to more human like speech that is indistinguishable from another person.

The earliest systems of natural language processing come in the form of chatbots, one of the earliest of which was called ELIZA. ELIZA worked on the premise that it recognised certain words or phrases from the sentence that was given and responded with a pre-set sentence (Weizenbaum, 1966). These were slowly improved over time and began incorporating learning algorithms, one of the most notable being Jabberwakky beginning in the late 1980s then being superseded by Cleverbot in 2006 (Cleverbot 2019). Large tech companies now have quite a large interest in this technology due to it’s power in delivering effective advertising to users.

Language recognition has been implemented in many areas of our current lives. Each of the major tech companies; Google, Apple, Facebook, Amazon, Samsung and Microsoft (Google assistant, Siri, M, Alexa, Bixby and Cortana respectively), have each created language recognition systems that interact with their platforms. One of the main purposes behind these systems is to deliver more targeted and effective advertising to consumers by knowing more about what that individual wants.

Google and Amazon have begun integrating these systems more into people’s lives with the advent of smart homes. Google home and Amazon Echo are devices that can control elements of a person’s home with just voice commands, from dimming house lights, to making calls to being able to order products online. It is hard to see these products not being integrated into modern homes more often.

Centrelink and the banking sector are two areas that have implemented natural language processing in their call centres to handle the simpler tasks. This removes potential jobs for people as these calls may make up a considerable volume of the call centres traffic. For the people remaining in these positions it may be a good thing as they have to deal with more serious issues from customers and receive a greater compensation for this. Secretaries and Personal assistants’ jobs may be of concern in the future with Google’s assistant making progress. This software is currently able to make appointments, set reminders and help organise a person’s day. With future improvements it may be able to take calls for businesses from people to set appointments, doctor clinics are an example that come to mind.

Currently I try to avoid using the voice functionality of my device and still prefer to type my queries into search engines. I also use an adblocker when online so that I get less disruptions while browsing. It was slightly worrying to discover that the few searches I did do through google assistant had all been recorded. Even snippets from conversations had been captured when someone had said ok in the background. If the reader wants to see their history, they can go to this link: <https://myactivity.google.com/myactivity?product=29>.

I don’t think this technology will have any negative effects on the people I know directly or immediately. I can see receptionist like jobs in the future becoming unavailable as they are replaced in part or wholly by this. Some of my friends have expressed their interest in the smart home devices and I could maybe see myself integrating one if I built a house and the convenience was worth the possibly reduced privacy.

**William Stevenson:** *Autonomous Vehicles*

There has always been a goal within engineering and technology fields to create a ‘driverless vehicle’. As of the 31st January 2018 there were 19.2 million motor vehicles registered in Australia (ABS, 2018) with most of these vehicles having small forms of automation already equipped. The end goal is to create a fully autonomous vehicle. The state of California (2019) defines an Autonomous vehicle as a vehicle that has the ability to be operated via technology without a human having any input into the operation or physical control of said vehicle.

The motivations behind introducing autonomous vehicles into society are due to a varying and broad range of reasons. Mainly autonomous vehicles are favored to increase the safety of a motor vehicle by reducing the provision for human error. A report into the benefits of autonomous vehicles by Damen, Hillier, Wright. (2015) states that “90% of all motor vehicle accidents have a human contributory factor” it also cites that the National Road Safety Strategy believes that the reduction in seriously injured Australians from road accidents will most likely be due to the implementation of autonomous technologies rather than changing the behaviors of humans.

Environmental and lifestyle impact is also considered to be a massive benefit to the introduction of autonomous vehicles to our society. Supporters of Autonomous vehicles have a vision to reduce the number of vehicles on the road by implementing a “mobility on demand” model whereby there will be autonomous vehicles on the road that will be shared. The Australia & New Zealand Driverless Vehicle initiative (2019) base this on the research results that show on average a car is parked 95% of the time, the implementation of a system very much similar to a taxi or uber where the user summons a driverless vehicle on demand will take the user to their selected destination. The utilization for such a system would also provide independence for many people whom have impairments restrict their ability to drive a piloted vehicle.

The way in which vehicle automation is currently used is by incorporating technologies into vehicles as “assistance technologies”. Vehicle manufacturers incorporate ADAS (Advanced Driver Assistance Systems) such as stability control, adaptive cruise control, electronic brake-force distribution, lane keeping technology, self-parking and other technologies that are utilized by autonomous vehicles every day, the main difference is that these technologies currently do not completely override the driver’s input and can be switched off (Weeratunga, Somers, 2015). These ADAS systems use a plethora of technologies such as long-range radar, Light detection and ranging, camera, short-/ medium range radar and ultrasound and that is just the technology involved in reading the environment the vehicle is in. Sophisticated software analyzing all input data then must be processed immediately and synthesized into outputs that will actually execute the driving of the vehicle through the ever-changing environment.

Testing of fully autonomous vehicles has been steadily progressing in controlled environments. In November 2018 Tesla started to introduce a feature known as ‘Navigate on Autopilot’. It gave the driver of the vehicle the ability to surrender control of the vehicle to the autopilot system which keeps the vehicle within its lane and at safe distances from vehicles around it while the driver removes their hand from the steering wheel. The driver must still monitor the system as there are many variables that the technology hasn’t got the ability to interpret currently.

The short-term future of autonomous cars relies not only on technology improving but in the regulation of the technology. There are huge issues within legislation about how a robot is to be regulated in terms of liability for accidents and personal and property liability. An incident in March 2018 involving a Volvo Xc90 where a woman was killed whilst the vehicle was being operated in autonomous mode really shook the industry and made apparent that there is a very real argument about who is liable for the operation of an autonomous vehicle. Improvements in technologies such as GPS, data mapping, Wi-Fi communications to collate environmental data, traffic data, weather and roadwork data are all factors that need huge amounts of man hours to bring more widespread roll out of autonomous vehicles.

The potential impacts of the implementation of autonomous vehicles on the road are mainly eradicating the shortcomings of human input to the operation of a motor vehicle. Factors such as the ability for vehicles to be connected via frequencies and radar to travel in closer proximities and without the need for reaction times are expected to reduce congestion, traffic incidents and improve traffic flow. This technology will impact the way we think of cars. They will essentially become vessels that we board instead of tools that we control. These vessels will be accessible to everyone as there is no longer a set of skills to operate, the disabled, young people and even the elderly will be able to have personal modes of transport and become more independent without reliance on public transport.

Another impact will be the need for greater investment in infrastructure and technology to support their operation on public roads, they will need heavily encrypted technologies to be able to protect the integrity of the overall communication and accuracy of the interpreted data that controls the vehicles. The environments that these vehicles will operate will need to be closely monitored to ensure that the desired safety of passengers and the greater public are actually advantaged by the introduction of this technology.

As far as jobs are concerned there will be a massive amount of people involved in implementation, maintenance, monitoring and improvement of these vehicles, infrastructure and the technology systems utilized by them. By impacting the number of motor vehicle accidents and thus reducing personal injury, other areas of society such as emergency services will become less stressed freeing up resources for other purposes. Autonomous vehicles are only a small progression from what we currently have. The main impact will be upon humans relinquishing total control to an artificial intelligence.

The affect of autonomous vehicles on my daily life will be very similar to many others where my commute to work will be a case of entering a vehicle and relinquishing control to the ai, where I would just be a passenger and keep myself occupied within the constraints of the vehicle. Would this be life changing for myself? … probably not, but if my commute was through dense traffic and longer than the 15 minutes it currently is, then yes. The ability to use your own vehicle to find a way home whilst intoxicated would be a big advantage not just for reasons of convenience but also for the safety of other road users.

If an autonomous fleet was to be rolled out, I wouldn’t always have to have 2 or 3 automobiles parked outside my house and within my garage. It would also mean I wouldn’t have to pay for parking at my workplace which would be a huge positive. By not having to store the cars on my property, I could make better use of my land and increase the size of my living quarters by utilizing the garage as living space which would reduce the need to purchase a bigger property later in life.

By utilizing autonomous vehicles, family and friends would again be able to travel with the same advantages stated above. Another positive to utilizing autonomous vehicles would be the ability to transport dependents without the need to personal drive them somewhere. Daily events such as school drop offs, sport training, medical appointments and other commitments could be carried out without the need for personally taking them saving the time taken to commute to and from the destination.

In conclusion Autonomous vehicles have many advantages but the sheer complexity of the technology, infrastructure, the legislation and the ability to put complete faith in technology to safely transport a living being will take many years to come to fruition.

**Wayne Zoutenbier:** Blockchain and cryptocurrencies

Blockchain started as a decentralised method of confirming and storing transactions. It based off the premise of a triple entry accounting method. It is a ledger that accurately records all information of a transaction as a block which is shared across a decentralised network. This block is confirmed frequently by multiple sources on this network, making it practically impossible to tamper with. While primarily used for the trade of cryptocurrencies, it’s potential use far extends beyond this.

*Where did it start?*

Traditional banking uses a centralised method to confirm and store transactions, because of this it’s prone to certain vulnerabilities and limitations. While unlikely to happen as an everyday occurrence there is possibility of banks manipulating transactions. There have even been proven cases in the United States of America where banks were caught re-ordering transactions to charge higher overdraft fees. With a centralised and private record of transactions the possibility of corruption is present. The other vulnerability is the security of these records, potentially allowing those with the technical knowledge to digitally alter them with malicious intent. Also, as a centralised method, each bank or network of banks is separate from one another, making the process of transferring money around the world a lengthy one as multiple checks on transactions must occur through separate entities as money moves locations.

Though the concept had been around beforehand the blockchain as we know it was created by a person or persons known as Satoshi Nakamoto in 2008. It was created as way of recording, verifying and publicly storing the transactions of the cryptocurrency Bitcoin. Many claim the creation of Bitcoin by Nakamoto was an anti-establishment move in direct retaliation to the corruption involved with the 2008 Global Financial Crisis, that saw the bankruptcy of Lehman Brothers and government bailouts of many other banks totalling over $700b USD.

The difference with Bitcoin as a currency is the blockchain, a decentralised method of processing and recording transactions. As a transaction is made it is stored in a block, a block can store many transactions, each block contains a marker of the previous block thus forming a “blockchain”. These blocks are stored on a decentralised network of nodes, they are then confirmed by checking against other blocks stored on other nodes. Being decentralised, this means no one owns the blockchain and all information is stored publicly.

So, what is this decentralised network and who is processing these transactions?

Since there are no central servers in blockchain it relies on many computers around the world to process its transactions. This is done using software loaded onto home computers or server clusters, it is known as mining. The process of transacting Bitcoins requires calculations to be solved before being added to block, these calculations require a certain amount of power from a computer and the time it takes to complete a calculation is measured in a hash rate.

What’s in it for miners?

Miners are the backbone of the blockchain, without them there would be no way to store and perform transactions. The more miners there are the more secure the blockchain becomes as it can be verified across even more sources. So, miners are rewarded for completing calculations, each time a calculation is completed a miner receives a fraction of a Bitcoin. This in turn, is what creates more Bitcoins and grows its economy. As the number of miners and currency increase the calculations become harder, thus pushing for more power to complete the task.

Miners compete to process these transactions, it becomes a race for all those involved. This pushes miners to build machines that enable them to have a higher hash rates, allowing them to process calculations quicker, securing a greater income. What first started with multiple CPU configurations quickly turned into multiple GPU setups as the most efficient way to mine. In fact, mining became so lucrative that users from all around the world were moving so fast build machines using upwards of 8 GPUs per setup that graphics card manufactures increased their prices significantly due to supply and demand, much to the distaste of gamers around the world.

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This impact of blockchain will be far reaching for some time to come. Being a decentralised open sourced system, the rise of Bitcoin started an array of many other cryptocurrencies, all adding their own spin on how the blockchain works. The financial sector was rocked hard by the sudden outburst of cryptocurrencies. It changed the way people made transactions online, it created its own economy and made many extremely wealthy. With many countries around the world suffering from devaluing currencies do to inflation, cryptocurrencies have become viable way to safely invest money. It has in fact become so popular that governments around the world have recognised this as a legitimate source of income and begun to tax any gains acquired through its trading.

Financial institutions are also starting to turn to the blockchain technology, embracing is potential and turning away from centralised methods. While these banks are not yet moving completely to a blockchain based system they are implementing it to process smaller transactions, loans or property management. Even in Australia the Commonwealth bank has implemented a trial of a blockchain system known as the Trade-Chain experiment.

Blockchain technology can be used for more than just logging financial transactions. Smart Contracts are an area with incredible potential. They can completely do away with traditional paper-based contracts. With the ability to automate payments based on specific conditions being met using compatible cryptocurrencies, such as Ethereum. A contract could be agreed upon by parties and committed to the blockchain, once this happens it cannot be tampered and there is no risk of loss as just like with regular transactions it is verified and stored by all nodes replicating the blockchain. Smart Contracts could be used in all sorts of ways, from supply chain and distribution to housing contracts, banking loans, and insurance claims.

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It’s likely your information will make it onto a blockchain at some point, perhaps with your records at medical centre or a customer reference management system. One of the most interesting ideas to come out of the blockchain technology is decentralised applications, potentially creating completely private social media networks or messaging platforms as being stored in a blockchain there is no governing body. There are even groups looking to change the internet as we know it, moving towards a decentralised internet using blockchain. As we all know now, privacy of your information is a hot topic and one that affects each and every one of us. With mega companies such as Facebook and YouTube constantly monitoring your browsing habits and selling off your information to third parties many consider current internet tainted. Companies such as US based Blockstack are well on the path to making a decentralised internet a reality, with 74,000 domains registered on their platform and over 7000 members in their development community.

Whether you’re into finance or not, blockchain will affect us all eventually. Its potential use far outreaches its beginnings as the backbone of the Bitcoin. It’s ability to securely store and verify data integrity without the need for centralised servers allows this technology to be used for many functions. One day it may even decentralise our whole internet, taking the power away from mega corporations and opening it up to further innovation. With that we’ll all see and feel the effects of blockchain one way or another.

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