

A compilation of reports on the current state of tools, technologies, developments and employment trends in the Information Technology industry.

# Information Technology Report

By Team TechPro's - Dylan, Arin Edwards, Jacob Darling,  
Joshua Coppen, Ryan Bullock and Seth Underdown

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## Industry Data – Job Statistics

Name	Job Title	Rank by Title (Burning Glass Technologies, 2018c)	Required IT Specific Skills (Burning Glass Technologies, 2018a)	Required General Skills (Burning Glass Technologies, 2018b)	Three highest IT Skills (Not in Required Skill Set) (Burning Glass Technologies, 2018a)	Three highest General Skills (Not in Required Skill Set) (Burning Glass Technologies, 2018b)
Arin	Security Analyst	#43 (173 job postings)	<ul style="list-style-type: none"> <li>● SQL - #1</li> <li>● JavaScript - #2</li> <li>● Java - #3</li> <li>● Microsoft Windows - #4</li> <li>● SAP - #5</li> <li>● Microsoft C# - #6</li> <li>● Linux - #7</li> <li>● Python - #13</li> <li>● C++ #58</li> <li>● VMware - #155</li> <li>● C# Programming - #172</li> </ul>	<ul style="list-style-type: none"> <li>● Communication Skills - #1</li> <li>● Problem Solving - #2</li> <li>● Organisational Skills - #3</li> <li>● Writing - #4</li> <li>● Team Work - #5</li> <li>● Planning - #7</li> <li>● Analytical Skills - #17</li> <li>● Computer Skills - #27</li> <li>● Listening - #38</li> <li>● Typing - #47</li> </ul>	<ul style="list-style-type: none"> <li>● .NET Programming - #8</li> <li>● Microsoft Office - #9</li> <li>● Oracle - #10</li> </ul>	<ul style="list-style-type: none"> <li>● Troubleshooting - #6</li> <li>● Planning - #8</li> <li>● Detailed Orientated - #9</li> </ul>
Dylan	Software Developer	#19 (337 job postings) Software Dev	<ul style="list-style-type: none"> <li>● SQL - #1</li> <li>● JavaScript - #2</li> <li>● Java - #4</li> <li>● Microsoft C# - #6</li> <li>● Linux - #9</li> <li>● Git - #19</li> <li>● Python - #20</li> <li>● PHP#33</li> <li>● C++ - #58</li> <li>● Visual Studio - #96</li> <li>● AWS - #167</li> </ul>	<ul style="list-style-type: none"> <li>● Communication Skills - #1</li> <li>● Problem Solving - #2</li> <li>● Team Work - #5</li> </ul>	<ul style="list-style-type: none"> <li>● Microsoft Windows - #3</li> <li>● Building Relationships - #5</li> <li>● Technical Support - #7</li> </ul>	<ul style="list-style-type: none"> <li>● Organisational Skills - #3</li> <li>● Writing - #4</li> <li>● Troubleshooting - #6</li> </ul>
Jacob						
Josh						
		<i>Similar titles:</i> #3 .Net Dev #6 Front End #7 Java Dev #11 Software Engineer #12 Snr .Net #13 Snr Java #15 Web Dev #17 Full Stack				

## Industry Data – Job Statistics

Name	Job Title	Rank by Title	Required IT Specific Skills	Required General Skills	Three highest IT Skills (Not in Required Skill Set)	Three highest General Skills (Not in Required Skill Set)
<b>Ryan</b>	Systems Admin / Server Engineer	#4 (786 job postings)	<ul style="list-style-type: none"> <li>● Microsoft Windows - # 3</li> <li>● Project Management -#4</li> <li>● SAP - #5</li> <li>● Technical Support - #7</li> <li>● Linux - #9</li> <li>● Customer Service - #10</li> <li>● Microsoft Office - #14</li> <li>● ITIL - #16</li> <li>● Systems Engineering #20</li> <li>● Business Process - #21</li> </ul>	<ul style="list-style-type: none"> <li>● Communication Skills - #1</li> <li>● Problem Solving - #2</li> <li>● Troubleshooting - #6</li> </ul>	<ul style="list-style-type: none"> <li>● SQL - #1</li> <li>● JavaScript - #2</li> <li>● Java - #3</li> </ul>	<ul style="list-style-type: none"> <li>● Organisational Skills - #3</li> <li>● Writing - #4</li> <li>● Team Work - #5</li> </ul>
<b>Seth</b>	Software Engineer	#11 (539 Job postings)	<ul style="list-style-type: none"> <li>● Javascript - #2</li> <li>● Microsoft C# - #12</li> <li>● Java - #3</li> <li>● Python - #22</li> <li>● Git - #19</li> <li>● Linux #9</li> <li>● C++ - #58</li> <li>● Software Engineering - #15</li> <li>● SQL - #1</li> </ul>	<ul style="list-style-type: none"> <li>● Communication Skills - #1</li> <li>● Problem Solving - #2</li> <li>● Team Work - #5</li> <li>● Detail Oriented - #8</li> </ul>	<ul style="list-style-type: none"> <li>● Microsoft Windows - #4</li> <li>● Business Management - #2</li> <li>● Building Relationships - #8</li> </ul>	<ul style="list-style-type: none"> <li>● Organisational Skills - #3</li> <li>● Writing - #4</li> <li>● Mentoring - #13</li> </ul>

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## Industry Data – Job Statistics

### Has your opinion of your ideal job changed? Why or why not?

**Arin** - I was looking at my other group members jobs and a lot were in the top ranking, even with most of them being in top 20. My ideal job being at rank 43 felt like it would be better to go into a different job category that had more interest to employers otherwise it would be quite difficult to find a job as a Security Analyst. It's good also that I am up for change and wasn't also fixed on being a Security Analyst. Being able to look at this data I would more than likely choose something within the top 10 – 20 as it's obviously in higher demand and I particularly enjoy most jobs that are related to Information Technology anyway.

Security analyst while almost vital to some companies are not always in high demand. They require a range of I.T skills while also having many years in the field to be able to compete with others.

**Dylan** – The Burning Glass data hasn't changed my ideal job plans. The data shows my chosen path of software development is in quite high demand with employers – the highest of any generic titles. With regards to specific IT skill requirements, I was unaware SQL and Javascript are in such high demand with employers. I originally planned to focus on C, C# and C++, though with this information in mind I will shift some focus to also learning SQL, Javascript and other high-demand skills. This will ultimately increase my employability and ensure my skillset aligns with industry needs.

**Jacob** – The Burning glass data has not changed my views on the chosen ideal job. Software developer skills are ranked at the top of the IT specific skills list with Java being #4 and C# being #6 of the current languages I have used. I think however I might start focusing on JavaScript as it is ranked #2 on the list. The job itself is ranked quite low on the “Top Titles” Burning Glass data pdf. Being at #19 on the list. However, software development is a rather broad area. For instance, Java Developer is ranked #7 which is a software developer who uses java for programming. Overall, I believe that software developers will always be a large area of IT with a large amount of job listings available.

**Josh** – Looking at the Burning Glass data not much has changed much for me. I still would like to become a software developer. Most of the skills necessary for performing well in this job are right at the top of the rankings, both IT specific and general skills. Although the job title is only 19 in the most advertised IT job role I still feel as though it is a broad term and can relate to a lot of different areas such as web development which is ranked higher.

I think as we depend more and more on technology to make our lives easier and more efficient, there will always be a need for developers to create the software that we all rely on.

**Ryan** – With this information I am undecided if I should focus more on security, hardware and operating systems or move more into a data analyst role developing my skills in SQL further and learning more about mobile/web site building structures. An example job could be developing a mobile application that links back to a back-end web server running MySQL as this MCommerce market is growing and there will be a wide range of high paying jobs in this sector and could lead to him starting his own business one day.

**Seth** – Looking at the Burning Glass statistics, my opinion has not changed. The job I want is still a very high in demand job and all the skills necessary are mostly what I expected to have to need. It did surprise me how high in demand JAVA was though. I was surprised to know how high in demand JavaScript skills were. I will have to start focusing on learning that before I can move into this type of career. The main thing I have learned from this Burning Glass data is that I have a lot more study to do before I will be qualified to start working in this line of work.

# IT Work

## Choosing Who to Interview

When discussing as a group who we would like to interview, we fortunately had a few choices. We decided to interview Scott Peckover who is a web developer for the Australian government. In the government they have different work level standards known as the APS (Australian Public Service) level. Scotts' title is an APS level 5 developer.

## What kind of work is done by the IT Professional?

Scott works as a front-end web developer. The front-end web developers' job is to write code using HTML, CSS and JavaScript to create a website that a user will see and interact with. Whether it be the drop-down menus or the text on the screen, it is all done by a front-end web developer (Wales, 2019).

The office Scott works in, is currently using a technology called angular. Angular is an open source JavaScript framework. Whenever you log in to your myGov account you will see some of Scott's work as he builds the front-end web applications that you see in government online services such as Centrelink or Medicare.

One of the biggest projects Scott has worked on was building the web application on the National Redress Scheme. Scott's task in this was to build out both portals for the applicants of the National Redress Scheme and for the institutions involved.

Due to child sexual abuse in institutions such as churches, orphanages, schools and others the Australian government formed the National Redress Scheme following recommendations of the 'Royal Commission into Institutional Responses to Child Sexual Abuse' (About the National Redress Scheme, 2019).

## What kinds of people does the IT professional interact with?

Depending on what Scott is asked to do he can either work alone or with a multitude of different people. For the most part he works with other front-end developers in teams of up to five, each with their own specific tasks. He is also required to work with the back-end developers who deal with the Application Programming Interface (API) Layer, which accesses the data needed for an application. If need be, he also must work with analysts and user experience (UX) developers to understand the requirements of the task which he is assigned. On top of that Scott reports to a project manager who oversees and is responsible for the entire project.

Communication in teams is key to delivering a desired result any group project and it is no different here. Scott interacts with the entire project team through many channels such as email, skype and face to face conversations. All communication is thought of as an ongoing conversation with the only real set meetings being a quick five-minute morning meeting between the whole team to skim through what today will look like, allowing the team to contact each other throughout the day as need be.

## Where does the IT professional spend most of their time?

Visual Studio Code is the source code editor in which Scott spends most of his time creating the web applications. Scott spends a lot of his time speaking to other developers through the various channels listed above trying to figure out the best ways to implement certain features into their application which they may have never used before. When working as a team with other developers the office uses GitLab as their choice of version control. Depending on the project the team will all use a single mono-repository or multiple repositories which will talk to each other through a server.

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Project management is also necessary for Scott and the team to manage a project efficiently and to complete it in the time allocated. Jira is the project management tool that they use which manages employees' tasks and their workflow status.

### What aspect of his position is most challenging?

For Scott he finds using Angular difficult to use as it is still a quite new web framework to use as there is a major update every six months. This makes him feel as though he and the team he works with are on the forefront of web development. This is not a bad thing as he feels it keeps him sharp and keeps the work interesting.

Whenever any of the developers are stuck with Angular, he tells me that google, and Stack Overflow are your best friends! He does feel that as Angular matures as a platform there are more and more senior authorities on the subject such as Angular University on best practices.

### What skills are necessary to succeed in his workplace?

Being able to work as a team and the ability to communicate are the foundational skills required to be able to succeed in Scott's workplace. On top of that a problem-solving mindset thinking creatively helps developers find solutions to problems they encounter daily.

Documentation is often overlooked but is a required skill for a front-end developer. Writing out good documentation in reports or even in Git is important so that supervisors and colleagues can understand clearly what Scott has completed or is completing.

Understanding the core concepts of programming is essential to be a successful developer. Technologies change so very quickly these days, but the core concepts remain and knowing them inside out helps developers like Scott learn new languages faster and easier.

Scott is eager to progress in his workplace, so having leadership skills is an integral part of Scott's journey. Working with people isn't always easy and having the skills to be able to handle different personalities will help Scott grow in his career.

### What does he enjoy the most about his position?

Scott loves the fact that he feels like he is a constructor of the software industry as the front-end developers get the plans from the architects, the analysts and the UX developers and they build those plans. He works with the back-end developers to get it all working, and when nothing goes wrong, and all the links come together it is really satisfying for Scott to be a part of.

### How does the IT professional think his workspace will evolve over time?

Scott points to the fact that even though the government is using such a new technology like Angular, it is the exception not the rule. Things still move very slowly in the public sector compared to its private counterpart. Something Scott predicts to happen in his workplace is the adoption of more open source software and products, but not anytime soon.

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### Does the IT professional have many conflicts within his team?

The team work well together for the most part but when things don't, they try to think of it as roadblocks rather than all out conflict. They are trained to see road blocks from other perspectives than their own and to work through them as one team.

These road blocks usually arise from missing requirements (the software requirements for what the team is building), a wrong interpretation of what those requirements ask for or implementation of development specific details (programming methodology, project architecture, specific technologies being used etc.). Scott reports that most of the time a resolution can be found just by communicating with each other but if not, the project manager is there and will determine the outcome.

### What goals have been accomplished by the IT professional?

Scott has achieved many personal goals since he started his time with the Australian government. Being part of a team that successfully released a major consumer product was a highlight for Scott. He has been certified by Oracle in Java technologies and some of the work he has completed are common components and libraries, which are being used across other important government projects by other developers.

### Where does the IT professional see himself in 5 years?

He has spent a lot of time with CI/CD (continuous integration and continuous delivery) especially with GitLab lately that he would like to use to a further extent as well as working more with security. Scott would also love to branch into other areas like API development and back end development.

Overall Scott would also like to become more independent as it is still early into his career, but he would love to give it a go alone in the future if the opportunity ever presents itself.

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## IT Technologies – Autonomous Vehicles Report

Autonomous vehicles are a new type of vehicle on the market. They are cars that are learning to drive without human assistance. So far, the autonomous vehicles are able to drive along highways and through some city streets, without needing a driver to be in control of the vehicle. They are also able to help predict and prevent traffic collisions by automatically braking and swerving the car into another lane if it believes it is a safe option. These features are also available when someone is in control of the car and has prevented many collisions when the driver wasn't paying full attention to the road.

The way the self-driving aspect of the cars work is by using sensors and/or cameras scattered around the car to create a virtual map of its surroundings. This virtual map contains the approximate locations of other cars, pedestrians, traffic lights and road lines. Uber's self-driving cars for example use 64 laser beams to help it map the surrounding area, while the comma.ai computer just requires a few cameras around the car to keep track of its surroundings. The cars also have a built in AI to help determine what actions to take under different circumstances. This includes lane merging, speed control, braking and collision avoidance. Most companies are developing the AI to react based off preprogrammed rules and protocol it must follow, while a company like Comma.ai is using a neural network set-up on their AI to have it learn based off how human drivers react in situations and how they handle all the driving aspects listed above.

At the current point in time, we are at level three of autonomous driving. This means we are able to let the car completely take control, but the user still has to be paying attention to the road and able to take control at any moment. The car is able to steer, accelerate, brake, change lanes and can attempt to prevent crashes. Car companies are predicting that by 2020 we will have fully autonomous self-driving cars on highways, and they will be ready for urban driving by 2025. This means that no human will be required to sit in the car while it drives from point A to point B.

The biggest contribution to the progress and performance of self-driving cars is the AI that dictates what actions it is taking. At the current rate AI is developing and improving it is no surprise that self-driving cars have quickly become a usable technology and are constantly improving at great speeds. The development of sensors and cameras also contribute to the improvement by allowing the AI to accurately map the area to help in its decision making.

The potential impact of this technology is safer roads for drivers and pedestrians. Studies show that 94% of all traffic collisions are caused by human error, be it by not paying attention or making poor judgment call while driving. If we were to remove the human element and used computers that can consistently make optimal decisions and not lose focus on driving, the rate at which traffic collisions occur should drop dramatically. This can also make public transport cheaper and more consistently on time.

It will also have a large impact on traffic and will decrease the chance of a traffic jam as all the cars would be able to communicate with each other to have the most streamlined journey possible. The main factor in a traffic jam is the fact the humans can't coordinate their driving perfectly with each other and will always make an error. An experiment done in Japan by Yuki Sugiyama showed that if a group of drivers were tasked with driving around in a circle at the same speed, a traffic jam would always occur. With self-driving cars the human aspect would be removed causing less chance of traffic problems.

This can also open up new sources of passive income for people who own a self-driving car though. Tesla intends to introduce a feature into their cars to allow them to act like an uber without a human driver required. This will allow people to have their car go out and be a taxi for people while the owner can sit at home or work while producing that passive income.

The biggest drawback though is people in driving jobs in society could likely lose their jobs to the self-driving vehicles. This could be buses, truck drivers and taxis. The human element could be removed from these and be purely run by AI. This could have both a positive and negative affect. Public transport would be more

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consistent with its arrival and departure times and be less likely to be in a collision. The negative is a whole job industry will be lost. It could also be less safe for bus commuters as there will be no authority figure to intervene if people act up.

This could affect my life by providing cheaper and more reliable forms of public transport. This will be extremely useful as I have lived in Melbourne before and understand how vital excellent public transport is there. This will help me reach my destinations on time without much worry of any delays. It will also ensure the streets are safer and that there is a lower risk of being involved in any kind of car accident which is very common in highly populated areas.

This technology could also help people in my family who struggle to drive, it could become a way for them to get around when they can't drive themselves. It would also provide a safer way to driving with people in the car. This is because the distractions won't be a risk anymore as the car will be doing the driving for you.

The downside to all of this though is that if it has the potential the human driving could not be allowed anymore in the future which could take away from the joys of driving yourself around. I find it fun to go onto road trips but there is potential that it could be seen as dangerous for human driving in the future.

Overall the introduction of autonomous vehicles could bring a lot of positive effects into our society, but it will come with many drawbacks that will greatly affect a lot of people's lives.

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# IT Technologies – Cloud, Services and Servers Report

## Introduction:

Servers and Clouds are a rather large area of the IT world that allows businesses and consumers to access data over a network. Everyone has accessed some sort of server whether it's a web page or a game server. Businesses used to use a local server to store, manage and process data. However today many businesses are now using a cloud computing service which allow access to this over the internet.

## What is it?

Cloud computing is the concept of having access to computer resources such as processing power or storage without having to directly maintain the service. The most common use of a cloud-based product is online storage which many people use as a backup of important information. Cloud computing often is used to describe large data centres which sell services such as storage to users over the internet.

This technology has come a long way in the last 5 years. As more people have access to high speed internet and as more companies create data centres the ability to have files stored in the 'cloud' is becoming easy. As a cloud server share resources with other servers it allows a process load to be shared.

Storage/Backup Clouds are beneficial for businesses as it allows businesses to store data offsite without having to deal with the process of maintaining an offsite server. Meaning a business will save money as they don't have to pay for maintaining the hardware involved or the cost of staffing such a server. Some downsides exist for using cloud services though.

There are several types of cloud computing as shown in Microsoft's "What is cloud computing" webpage. The first type is called a Public Cloud. These are owned and operated by third-party cloud service providers. Which sell access to use the cloud to users and businesses. One example of a public cloud is Microsoft Azure. The benefit of a public cloud is that all the hardware, software and supporting infrastructure is managed by the provider of the cloud service. Users access this service using the internet (Microsoft Corporation, 2019).

The second type of cloud computing is called a Private Cloud. This has the same principles as a Public Cloud however all the computing resources are exclusively for a single organisation or business. It also is maintained by the business instead of a third party (Microsoft Corporation, 2019). As private clouds tend to use proprietary technologies such as increased automation (Rouse, 2017). The cost involved in maintaining a cloud by having the necessary staff may go up. A private cloud is expensive as you are paying for all the server acquisition costs, support and maintenance. While if you use a public cloud, you are only paying for the resources you need/use.

The third and final type of cloud computing is called a Hybrid Cloud. A Hybrid Cloud is a combination of a public and private clouds which are bound together by technology that allows data and applications to be shared between them. This allows greater flexibility and more deployment options. Some downsides of using a Hybrid cloud is that the integration of the public and private clouds requires a software layer that allows them to communicate and a good internet connection to make sure that they communicate.

## The Future:

The future of the cloud computing and servers has been forecasted by Cisco in their 2016-2021 White Paper. They believe that by 2021 '94 percent of workloads and compute instances will be processed by cloud data centres; 6 percent will be processed by traditional data centres' (Cisco Systems, 2018). Cisco says of the cloud workloads 'By 2021, 73 percent of the cloud workloads and compute instances will be in public cloud data centres' (Cisco Systems, 2018). This would mean that most businesses who rely on traditional data centres are migrating to public cloud systems to help cut costs.

## IT Technologies – Cloud, Services and Servers Report

Cloud computing mainly impacts business however it also has an impact on everyday lives. Google just announced Google Stadia which is a cloud gaming service that will be able to stream video games to almost any device with an internet connection. Now this type of service isn't new as Nvidia has GeForce Now, PlayStation has PlayStation Now, and Microsoft has Project xCloud in development. All these services stream games from a data centre and stream it to a device. Google Stadia however has the backing of a large amount of data centres which Google has been building around the world. This service supports the streaming of games at 4k resolution in HDR at 60fps and Google has said that the servers could eventually support streaming at 8k resolution at 120fps. The idea of streaming games is a very good idea. Console and Computer Hardware is expensive and having the ability to play 4k content at high frame rates requires extremely expensive hardware. Cloud computing solves this problem as the hardware itself is in a server. The cost of purchasing the hardware and maintaining it is done by Google. The customer pays a monthly fee to use the service. The only thing the customer needs is access to high speed internet and a device with a web browser.

### How cloud computing will impact?

Cloud computing has already impacted the world in a big way. Allowing large amounts of computing power to be available at the push of a button. Servers/clouds have allowed services such as Netflix and Stan to exist. Giving consumers the ability to watch a huge library of movies and TV shows at any time. The future of the cloud will mainly be more businesses migrating to the cloud instead of spending large amounts of money on buying and maintaining onsite servers. As you only need to pay for the resources you need and can easily pay for more resources if you need it. As businesses move towards using the cloud, they won't require any staff to maintain a server (unless they are using a hybrid cloud system). This could make it harder for people to find server-based IT jobs locally unless you live near a cloud data centre. However as more businesses start using the cloud, cloud providers will make more large server farms to keep up with the demand. In turn this would create more Cloud/server related jobs. As people will need to build and maintain these systems.

### How cloud computing will affect me?

Cloud computing already affects me in a couple of ways. For instance, I use OneDrive for storing important files such as photos and study work. The future of cloud computing may change how I game with Google Stadia coming out it may change the way I games. As cloud continue to grow more and more services will exist for consumers to buy. For instance, a service might exist where you have a complete computer in the cloud that wirelessly gets sent to a monitor with keyboard and mouse and you do all your work that way with little to no latency. As computers evolve the provider of the service upgrades the hardware. Instead of renting storage and processing power you are instead renting an entire working computer. That can browse the internet, play games, do video editing. All without the need of buying and maintaining the hardware. However, something like this may be quite a long way a way for consumers especially in Australia. As a service like this would require high speed internet and very low latency.

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## IT Technologies – Cybersecurity Report

Cybersecurity is the act of securing digital data and computer systems. Cybersecurity is usually guided by three main factors - confidentiality (secrecy), integrity and availability.

Confidentiality (secrecy) relates to the storage of sensitive information, such as personal information, payment details or any other sensitive data. Measures are taken to ensure information is stored securely and only viewable by authorized users or individuals. Malicious threats involve man-in-the-middle attacks, social engineering or access by unauthorized third parties.

Integrity involves ensuring only authorized people have rights to access, move, delete or modify data. Measures must be taken to ensure the users or individuals accessing the data are authorized and have the necessary rights to make such changes or view such information. Current technologies include the encryption of data during transit, use of user access controls and technologies such as checksums so end-users can check the integrity of the data received. Malicious threats involve the exploitation of invalid user permissions, avoiding of integrity checks (direct access) or use of another user's information.

The last factor is Availability - being able to access the data you are authorized to access. In a general sense, availability is ensured through redundancy methods such as RAID arrays, failovers, etc. In a cyber security sense, threats such as distributed denial of service (DDoS) attacks must be considered.

In summary, cybersecurity is protecting sensitive digital information from cyberthreats and malicious attacks. Such threats take many forms, such as malware, ransomware, phishing, man-in-the-middle and DDoS attacks. Many state-of-the-art technologies are available today, each aiming to counter specific cyber security threats. Government agencies and private enterprises make use of all the latest technologies to ensure their systems remain secure.

Technologies such as virus scanners can be used to identify and eliminate malicious software and files before they even have a chance to execute. This in some cases can entirely prevent the destruction of data or compromising of a machine, if the data base of known viruses remains up-to-date. Maintaining virus databases is an on-going job, hackers with malicious intent are always designing new executables which virus scanners don't yet detect. Some researchers have investigated using Deep learning to identify viruses, ensuring virus-scanner technology is always one step ahead ([Dewan, 2017](#)). If successful, this would allow anti-virus creators to identify new threats before they're even known or used maliciously, addressing the issue then.

Firewalls are a crucial technology to fight against cyberthreats this technology stops any threats from the internet trying to gain access to your local network. As mentioned previous DDoS are one such attack that a firewall can defend against by setting a **Packet rate per Source** maximum limit (QoS Rate limiting), this will monitor the source of the traffic in to your network and only allow that source to send at the rate you have set in turn stopping a source from sending too much traffic to your network and causing a DDoS attack ([Jackson, 2018](#)).

With all these technologies available, the main current cyberthreat is humans. Social engineering is often used to manipulate or trick staff into giving access or providing information the individual isn't entitled to. Technologies are slowly emerging which address this issue, such as end-to-end encryption, user-side encryption and full storage/data encryption. Such technologies ensure there's no way for employees or third parties to access data. Even if an employee or staff member was tricked (or had malicious intent), they would not be able to decrypt or access the data without the end-user's personal device or encryption key(s). Such technology is seen with Snapchat (where *my eyes only* memories are encrypted using a pin only the user knows) or WhatsApp (where messages are encrypted end-to-end – no server in-between can read them). Even with these technologies, human-error can still exist – if the WhatsApp user loses their phone, all the messages become available to a third party.

## IT Technologies – Cybersecurity Report

Deep learning will likely have a huge impact on cybersecurity as it will allow computer systems to protect themselves against cyberthreats without having to wait for the cybersecurity engineers to develop a patch for the vulnerability.

The changes this will have will be very impactful as it will remove the need for “zero day patches” and remove the need for a systems administrator to monitor that their security systems have to be always up-to-date. Deep Learning could even fix a flaw in a router’s firewall as it would locate where the entry of the attack started and correct it.

I had a personal experience in 2016 where a client’s files was maliciously encrypted. The attacker had encrypted the files and demanded payment for decryption (ransomware). With deep learning, this sort of action could have been detected before it happened. The original infecting file would have been detected as malicious and deleted, or the actions attempting to encrypt files would have been detected as unusual. Ultimately, this would have saved the client thousands in avoiding downtime and staffing costs in restoring from backups.

These new technologies have the potential of impacting the job market. As cybersecurity is moved towards machine-based deep learning, the need and demand for cyber security teams may fall. Cyber security experts may need to branch out into other areas of cybersecurity, such as operating, maintaining and securing the new deep learning machines. Further staffing may be required to assist in the production of algorithms, datasets and statistics for the machines. This may increase the job prospects for other IT experts.

On a personal level, these technologies help ensure my computer is secure and I remain secure online. This includes virus scanners alerting me of potential threats and encryption ensuring my personal data remains secure. In the future, further technologies will assist in ensuring my computer remains protected to any new viruses or exploits which are discovered. My daily life will remain like it is now, though that’s just the point – the aim currently is to advance technologies in a way that stays one step ahead of individuals who have malicious intent.

For others less technology educated, advancements in virus scanning and security technologies may help in ensuring everyday users are better protected. This may involve more automated, simpler virus scanners, the default use of encryption on files and messages or other means of background security where minimal user input or response is required. Ultimately, this will further reduce the number of major incidents relating to malicious software, hacking or cyberattacks.



# IT Technologies – Cybersecurity Report

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# IT Technologies – Raspberry Pi Report

## What Does it do? – Introduction

A Raspberry Pi is a state of the art low-cost single-board computer, typically the size of a credit card. It includes all the features needed to perform similarly to a desktop computer, to allow for electronical prototyping and development, and for any other general computing purposes. The device is feature packed, including video output (HDMI), USB with KB/mouse support and WiFi / ethernet. One particularly unique feature is the Raspberry Pi's set of general-purpose input/output (GPIO) pins, allowing for connection to all kinds of external devices such as sensors, LEDs or motors.

## What Does it do – Specifications

The newest model, the Raspberry Pi 3 Model B+, contains a Cortex-A53 (ARMv8) 64-BIT SoC running at 1.4GHz. This is coupled with 1GB of LPDDR2 RAM and a BroadCom VideoCore IV GPU running at 400MHz (Raspberry Pi Foundation). The Model 3 B+ is a very capable machine, with specifications allowing for fullHD video playback, web browsing and light gaming. This device retails for around \$50-60.

The Raspberry Pi Zero is a budget model Raspberry Pi, including only the bare minimum features and hardware. This device is aimed for use in end-user products or low-cost IoTs, though can be used for development (albeit not ideal). The device is state of the art as it allows developers to create a prototype using a fully featured Pi, then transfer the code directly to a Pi Zero for use in end-user products/devices. These devices cost around \$10-20.

## What Does it do? – Desktop Computer

Using Raspbian (a Debian-based computer operating system) the device can function similarly to a standard desktop computer. Raspbian includes a user interface with all the standard capabilities one would expect from an operating system. It contains pre-installed applications for browsing the web, word-processing, playing high-definition video and even various applications for programming and development. With just the addition of a keyboard, mouse and screen, a Raspberry Pi can serve as a very capable first computer, without the typical costs involved.

## What Does it do? – Development / Electronics / IoTs

The Raspberry Pi includes a set of general-purpose input/output (GPIO) pins – 26 on older models and 40-pin on the later. GPIO pins are very diverse, limited only by electrical, timing and software limitations. Third party add-ons can be used to increase the electrical and timing capabilities, such as motor controllers or power supplies. Features of this kind are state of the art for development and prototyping of electronical devices, such as IoTs. Using a Raspberry Pi, a developer can begin coding the software and prototyping electrical circuits right away, without the need for dedicating timing chips, SoCs or other parts. This is beneficial in reducing time, effort and cost(s).

Once a prototype is created and customisations are made, further cost saving measures can then be made. This may include switching to a Raspberry Pi Zero for use in the final product, keeping the cost of the final product down.

## What Does it do – The future?

Over recent years we've seen the Raspberry Pi creep into new markets previously held by only full desktop computers or specialty equipment/devices. A great example of this is the wide-spread adaption of Raspberry Pi's as media PCs – eliminating the need of a dedicated desktop computer for this purchase. This is all thanks to the technology advancements in system on chips (SoC), allowing for more processing power at a heavily reduced cost.

Into the future these performance increases will continue – we'll see higher CPU clock speeds, faster GPUs and more RAM. Much faster processors are already seen in some mobile devices, showing the technology is



## IT Technologies – Raspberry Pi Report

available, though is currently price and supply limited. As further advancements are made, the price of these currently high-end chips will fall, allowing for them to be used for lower-cost applications such as Raspberry Pi's. The use scenarios as performance increases are almost never-ending. In the future we could see consumers using Raspberry Pi's to power laptop-like devices, serving as a stand-alone replacement to a traditional laptop.

### What Impact Does the Raspberry Pi Have?

The main impact Raspberry Pi has had is increasing both education and interest in computers and electronic development. In current times, Raspberry Pi's are often seen as part of advanced computing classes in schools. The Raspberry Pi Foundation themselves believe their biggest impact is the 'tinker-friendly' nature of the product. They state this encourages more people to experiment with computers once again, something which was lost slightly with how simplistic and user-friendly computers are today (Richardson, 2016). In the future I believe Raspberry Pi will become available in more schools and as part of more IT courses. This will allow an increased number of students to gain further interests in the tinkering and hacking side of information technology, development and electronics.

In terms of specific use scenarios, the Raspberry Pi is slowly creeping into the home media space. Using programs like Kodi (a media center application), Raspberry Pi's can serve as fully functional media centers, all at a very reasonable price. This use scenario could potentially impact the media player market, specifically things like Chromecast, AndroidTV, etc. Raspberry Pi's are also commonly used as game console emulators, allowing for a variety of games to be played on the one device. In this scenario, the Raspberry Pi typically costs less than even a single console, let alone all which it emulates. This use scenario appears to be very popular, with searches for RetroPie (the software typically used) peaking each time a new Raspberry Pi is released. (Google Trends, 2019)

### How Will Raspberry Pi Affect Me?

Currently I own a Raspberry Pi 3 B+ which is used as a media PC, running Kodi. For my family/friends this serves as a more user-friendly and faster media center when compared to other options such as AndroidTV or TV USB Ports. Playing to the device is as simple as right-clicking a media file in Windows and clicking **cast-to: Kodi**. For me personally, my Raspberry Pi has reignited an interest in tinkering and programming/development, especially development involving electronics. The GPIO pins have been wonderful for use with various electronics such as LEDs, small motors and sensors. In the future Raspberry Pi and similar technology will be greatly helpful to me when developing *Internet of Things* (IoT's) and other small electronic devices, allowing me to experiment with the development and programming of such devices. In the future, as more powerful Raspberry Pi's become available, the technology will further impact other areas of my life by replacing existing technologies. This may include things like gaming consoles, various typical desktop computer applications and possibly even server-like/cloud hosting use applications, replacing existing servers at a reduced running cost.

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## Project Idea – Delivery Assistance

For our project, our team has decided on an app that automatically provides navigation on a delivery drivers phone, using delivery information from existing servers. This app can also monitor the drivers speed, location, and trip distance, potentially interfacing with Payroll software to automatically pay car allowances where applicable.

This idea came from Seth's experience as a delivery driver for Dominos, so we will be using Dominos as our example delivery company as we have familiarity with it. Seth noticed that most people he works with will open Google Maps after they have already begun driving to find how to reach their destination. This creates a major driving hazard as they are taking their eyes off the road to type in the location that they need to deliver to. It can also promote phone use while driving as their phone is typically held to view maps, thus encouraging replying to messages or other notifications received.

Inside Dominos stores there's a computer that shows orders awaiting delivery, along with the delivery driver assigned to that order. This existing system tracks the GPS built into the sign on top of the driver's car (a *Topper*). Our app could connect to the Dominos server, receiving the delivery location and driver assigned. When an order is assigned, the delivery location information is also sent to navigation software on the driver's device, providing directions without the hassle of stopping to enter an address. This would allow the driver to leave their phone in a phone car mount, discouraging the use of their mobile device while driving.

The app could send back location data, eliminating the need for a *Topper*, ultimately cutting costs. The app could also incorporate further features, such as alerting employers when driver's use their devices for other purposes while out on deliveries. This would discourage the use of mobile devices while driving, increasing safety for delivery drivers and other motorists. The app could also send back speed data, ensuring the driver is following all applicable speed limits and driving safely.

This app would require a reliable navigational service, such as Google Maps API or similar. The app would also need a way of connecting to Domino's internal servers, allowing for data to be shared between servers and driver devices. Similar problems would arise with other potential customers, each company will have differing existing systems. This would be a part of the service we provide – we make our app work for the customer. We would ensure the app we create interfaces perfectly with their existing servers and equipment, keeping costs to a minimum.

A potential issue may be seen where employees have phones with poor GPS tracking built in. This would cause inaccuracies and may be problematic. There may also be concerns around privacy, for example if stores were to track drivers who hadn't clocked off correctly.

The outcome of this project would be a safer way for delivery drivers to navigate, ensuring a safer trip. Efficiencies would increase and costs would be reduced, especially for companies who currently use dedicated tracking equipment.

## Tools – Github Repository Reflection

### How well does the audit trail on the git repository reflect the groups work?

Using a git repository has been a good experience for the group. The repository was heavily used, with over 150 commits added to the repository. Some members used the Git website to add their commits, some used the application and others used command line. Though there's differences in the number of commits made, all members equally made great use of the repository to work collaboratively, particularly on the Gitpage.

Dylan and Josh took a lead in this assignment, something shown through the amount of commits they had. They both often made frequent commits to make minor changes fixing spelling errors, theme changes or assisting in constructing drafts.

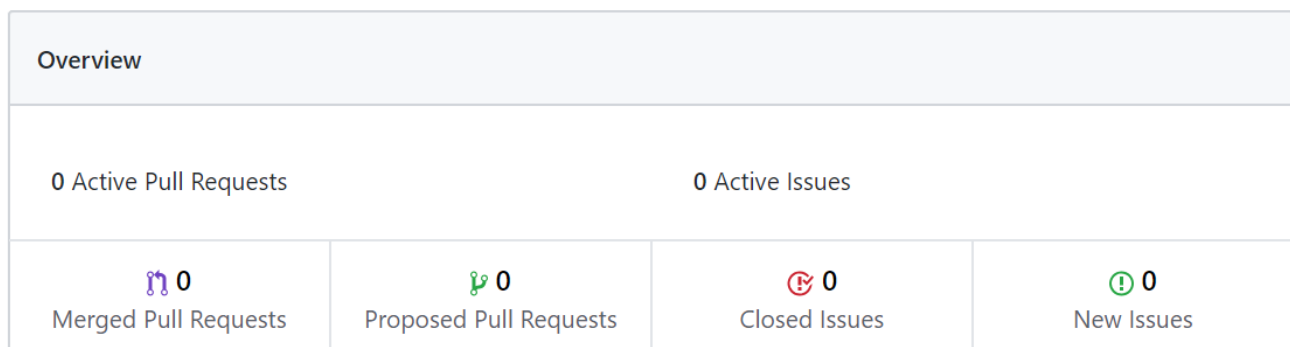
Many of Dylan's earlier commits were minor adjustments to the content and theme of the Gitpage, as his theme was used. Dylan's later commits were further changes to the Gitpage, report drafts and various other documents, assisting the team where possible. Josh completed a similar number of commits through tweaking of reports such as spell checking, minor fixes and adding his own contribution. Arin, the last member to join the group, has added many commits. Arin made use of the Git website to make commits, resulting in a slightly confusing audit trail where files are first deleted then re-added anytime he uploads changes. Jacob, Ryan and Seth were all assigned individual reports to do. This is shown briefly in the audit trail, though most of this work was done locally with many changes submitted at once.

As a group it was agreed the audit trail alone doesn't directly reflect the amount of work done by team members. An example of this is seen with the number of commits Seth has made; far less than others. Seth was assigned the Autonomous Vehicles Report and prepared the foundation for our Project Idea report. As these reports were mostly completed locally, the audit trail doesn't reflect the amount of work done to produce these documents.

In summary, though not a great indicator of the level of work done by each member, the Git audit trail does accurately reflect the live changes made to the Gitpage and repository files. This audit trail would prove beneficial in checking notes after code is changed. At the very least, one could establish who changed the code and contact them to request further information. In our case, most commits were made with clear, descriptive information explaining changes made.

March 12, 2019 – April 12, 2019

Period: 1 month ▾



Excluding merges, **6 authors** have pushed **152 commits** to master and **152 commits** to all branches. On master, **48 files** have changed and there have been **875 additions** and **0 deletions**.

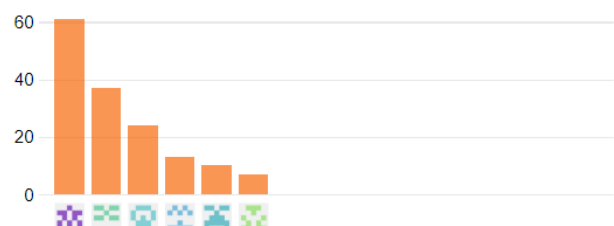


Figure 1 - Git Pulse overview

## Tools – Github Repository Reflection

Mar 17, 2019 – Apr 12, 2019

Contributions: Commits ▾

Contributions to master, excluding merge commits



Figure 2 - Git Repository Contributions Dashboard

TechPro's Git page:

<https://joshcoppen.github.io/Assignment-2-Team-Project/>

TechPro's Git Repository:

<https://github.com/JoshCoppen/Assignment-2-Team-Project/>

# Group Reflection

## Group Feedback – Summary

### What went well?

As a group we managed to complete assigned tasks by communicating via a program called Discord. Discord allowed our group to communicate at any time via text, with a more in-depth voice conversation once a week. This kept us organised and allowed for all members to raise any concerns or issues they came across. Two of our members took the role of project manager and coordinator which proved to be a huge success. One member would be assigned a task while other members were assigned the role of proofreading and editing later. This ensured all work produced was up to a standard deemed acceptable by the team, while sharing the workloads amongst members.

GitHub was used to allow the group to make changes to the website as required, it worked well for this. We attempted to use GitHub for document editing, though some members found Microsoft word would crash when other members were editing the same document. We also noted there was no difference checking using Git, as the documents are binary files. Eventually we switched over to GoogleDocs for documents, avoiding this issue completely. GoogleDocs worked flawlessly and allowed for real-time collaboration.

### What could be improved?

At times there was some confusion around what work needed to be completed. Our team felt we could have improved this issue by better communicating what work has been done and what's still required, avoiding confusion amongst members. We eventually resolved this issue via adding an announcements channel on discord and creating a 'to-do' list on Google Docs, clearly assigning tasks where applicable.

Some members believed a cloud-based project management solution could have been beneficial. This would've helped the group avoid overlapping work in the early stages of the assignment while eliminating the need for regular progress reports.

### What was surprising?

Our group was particularly surprised by how easy it was to get tasks completed without any face-to-face contact. Some members had feared peers may not do their fair share or communicate, though this wasn't an issue for our group. Our group all participated and worked together to get tasks completed.

### What has the group learned about groups?

As a group we learnt communication is key. Be it good or bad news, keeping everyone on the same page is vital for effective teamwork. We found having clearly defined tasks in the form of a to-do list was beneficial in keeping our team on track and avoiding confusion. Our team also found collaboration tools are important to teams. By making use of both GoogleDocs and GitHub, our team was able to collaborate effectively with no face-to-face contact required. We were able to operate over the internet as effectively as any team on campus or in a work environment.

# Group Reflection

## Arin's Feedback

### What went well?

Everyone was able to put forth their own parts of the assignment which immensely helped us all out. Group communication was great via Discord and other sites. We also had people in our group that were guiding other people and proof checking while also doing their own work. Having these people in our group really helped everyone out.

### What could be improved?

Wasn't much communication at the start of the assignment which made a little bit of stress for our group. My knowledge of GitHub and other networks used.

### What was surprising?

Was surprised on how well people could use certain programs in our group, previous experience we had which helped us all greatly with creating our website.

### What has Arin learnt about groups?

I was a little bit sceptical on how well a group would work being as our studies are online and it can be hard to get reach of someone if you don't see them in person. Was also sceptical about how we could make it all come together but with the use of GoogleDocs and Github it really made everything a lot easier and less stressful throughout our group.

## Dylan's Feedback

### What went well?

The team made use of various technologies (Google Drive, Git, Discord) to increase communication and collaboration. This proved beneficial in allowing the team to work together and collaborate on HTML documents (Gitpage) and assignment documents (via GoogleDocs).

### What could be improved?

At the early stages some communication went unnoticed due to the level of discussion in the one Discord chat, though at later stages this was resolved by adding a second 'announcements' channel.

We could have used GoogleDocs all along to avoid the issues we had in editing Word documents (*binary files*) using Git. This would have avoided issues which arose when multiple members had files open at the same time.

### What was surprising?

I was surprised by how well everyone worked together online. Everyone made use of various technologies to work together and we all assigned work amongst each other to share workloads around.

### What has Dylan learnt about groups?

I've learnt teams work very well where individual roles are clearly defined and/or work is clearly assigned. Our team made use of to-do lists with clearly outlined tasks and work assignments to ensure everyone knew what needs to be completed and what they're responsible for.

# Group Reflection

## Jacob's Feedback

### What went well?

Team communication for the most part was alright thanks to discord. We had 1 meeting on a discord voice chat a week which made sure we were all on track. The website itself was made a lot easier thanks to Dylan's template.

### What could be improved?

Although we had 1 voice chat a week we had the problem of being all on at the same time. Which slightly affected communication.

### What was surprising?

It was interesting working with people online. Very different environment to a workplace or school. Using google docs with its live updating allowed all of us at the same time to edit documents and add information which made teamwork a lot easier.

### What has Jacob learnt about groups?

At the start i wasn't sure that online teamwork would work. As everybody has to communicate with each other. However, as we all were able to make a group pretty early on and we all knew about discord. We were able to make a group very quickly and start organising.

## Josh's Feedback

### What went well?

I feel that the team communicated well for the most part, every member of the team made themselves available on Discord. Discord was a helpful tool for us to chat as well as share documents. Each member of the team was happy to take on tasks and completed them within the necessary timeframes.

### What could be improved?

Using a project management tool would be beneficial for the team to monitor their progress with each specific task. Having a weekly voice chat dedicated to a single night at the same time (e.g. Wednesday at 7pm Melbourne time) would help the group understand how everyone is going, especially for the quitter members of the group.

### What was surprising?

I found it interesting working with other people all around the country, as this is the first time, I have been involved in group work from home.

### What has Josh learnt about groups?

There not as bad as I thought it would be. Before starting this assignment, the thought of working in a group made me a little nervous as I really didn't know anyone from the class, but it must help that I got a decent group of guys to work with.

# Group Reflection

## Ryan's Feedback

### What went well?

I believe we had a really strong team where everyone was doing their fair share of work, Discord was a very powerful tool we used to keep everyone up to date and discuss any concerns that a group member had. The group also used google docs to list tasks that had been assign and then right a note when completed. Also have a live chat once a week really helped everyone get to know each other.

### What could be improved?

Having a more synced live stream project management software so everyone could see and comment on each other progression. But I feel we handled our group really well.

### What was surprising?

I was really thinking my group would struggle with communicating and be organized but it really turn out to be a fun exercise and very easy to link up and have the project come together.

### What has Ryan learnt about groups?

I have learnt that as long as you communicate with your group and all agree on which task each is member is going to do, it is also a good idea to get feedback from each group member on your work so you all agree on the work quality.

## Seth's Feedback

### What went well?

The team worked really well together and communicated excellently the whole time. People would constantly offer feedback and help to those that needed it. We also managed to organise ourselves well and allocated different jobs to different people without any hassles.

### What could be improved?

Would help if we started using something like Google Drive earlier in the assignment for documents that are being written in by multiple people so we didn't have problems when uploading word documents into the git repository that another person had edited. Also a better way to track the progress people had made on their parts of the assignment would have been helpful.

### What was surprising?

It was surprising seeing how easy it was to get along with each group member and how well we were able to coordinate ourselves since we had never spoken prior to this assignment.

### What has Seth learnt about groups?

I have learned that groups can work well together even with no contact prior to starting the work that they have ahead of them. It can also be a really good way to streamline the work that is required as multiple people can be working on different parts at once or can be helping each other on the same job.