Industry Data

**1) What are the Job Titles for your group's ideal jobs? How do each of these rank in terms of demand from employers?**

|  |  |
| --- | --- |
| **Name** | **Industry Demand** |
| **Cintia Michel**    **Software Engineer**  My decision to focus on being a software engineer has solidified after reading the industry data. This field is exactly what I wanted and more. I didn’t know there were 23 million software engineers in the world today. They created they foundation of what our lives are – our banking, shopping, agriculture, stocks, music, videos – nearly everything! Without computers, society would fall apart.  Software engineering is growing so rapidly and in such high demand, the odds of getting a fun and interesting job is very high if I apply myself and gain expertise in my chosen field of interest – UI design. Software engineering is projected to grow 22 percent from 2019 to 2029. That is faster than most jobs.  The new inventions and applications that are being developed make software engineering a really exciting realm to be in. I hope to work in one of the most innovative companies on the planet – Google – and one day apply my knowledge to create products that give customers a great user experience. | 1) Software Engineering was ranked as the number one most in-demand job in the Information Technology sector (Labor Insight Skills in Greatest Demand - Burning Glass Technologies, 2018).  2) The employment of software developers is projected to grow 22 percent from 2019 to 2029. This is faster than the average for all occupations. There is an increased demand for computer software as industries become automated and more reliant on computer systems (U.S Bureau of Labour Statistics - Computer and Information Technology, 2020).  3) Among all IT products and services, Enterprise Software grew at an 11.1% rate in 2017 and is expected to grow at an 8.4% rate in 2019 (Gartner Says Global IT Spending to Grow 3.2 Percent in 2019, 2020).  4) Today, the world runs on software and the people who create it. As of 2018, there are 23 million software developers worldwide. This population is expected to grow to 27.7 million by 2023. The US is the birthplace of software development and has therefore always had the largest developer population. However, there is strong growth is in countries like China, India and Brazil. China is the top nation for growth, with a developer population rise forecasted to range between 6% and 8% each year leading up to 2023. India is set to take over the US in 2023 and have the largest developer population in the world (Evans Data Corporation | Developer Population Growth Shifts Toward China, India and Emerging Countries | Press Release, 2020).  5) Some of the world’s largest companies hire software engineers. These include Google, Samsung, IBM, Microsoft, Amazon, Facebook, Oracle, Apple, Intel, Yahoo, SonSoft and SAP (The 10 companies hiring more software engineers than anyone else in Silicon Valley, 2020). |
| **Dhilrukshi Pathmanathan**    **Quantum Researcher**  My desire to become a quantum researcher has increased after analysing all the industry data. It was exciting to read CSIRO’s “Growing Australia’s Quantum Technology Industry” 2020 report. Quantum technologies are going to create many avenues for job growth and increase Australia’s economy, injecting a possible $4 billion dollars.  Australia’s mining sector will greatly benefit from quantum research. The new materials and drugs that will be made by learning more about the mathematical connections between electrons will be enormous. For example, the simple caffeine molecule is too complex for a classical computer to decipher, but it is hoped a quantum computer will be able to generate an accurate simulation. I’m also interested to see how quantum computers will provide solutions to the environmental sector, helping reverse the effects of climate change, clean up oceans and protect wildlife from extinction.  Quantum computing is just getting started. Two decades ago, it was a purely theoretical field. Currently, University of NSW is the only higher education institution in the world that has a degree in quantum computing.  But as more research and technologies are released for commercial use, including a quantum internet, more interest and investments will be given to quantum computing. The sector will grow and prove to be revolutionary in the next few decades. | 1) Quantum technologies are going to create incredible research opportunities throughout the world. Businesses in Australia are set to generate over $4 billion and create 16,000 jobs by 2040. Our Quantum Computing industry is predicted to be worth $2.5B and produce 10K jobs. Globally, quantum technologies are projected to create an estimated $86 billion by 2040 (Growing Australia’s Quantum Technology Industry - CSIRO, 2020).  2) Quantum research opportunities range in industries from technology companies such as Google, IBM and Microsoft, to the defence, mining and medical sectors. Some examples of how quantum research is used commercially include drug discovery and development, as well as materials development. Research will be enabled by accurate chemical simulations that can be built on a quantum computer. The level of computation in classical computers cannot comprehend the complex structure of most molecules. Quantum technologies are creating stable and highly precise sensors for mineral exploration, water and energy management. Quantum-encryption will enhance security for classified data and communications (Fisher, 2020).  3) Many governments are implementing investment programs to develop and expand their quantum industries. Since 2017, at least 5 nations have created billion-dollar scale quantum technology research and development initiatives. China is one of the largest investors, reported to be spending $14.7 billion to build the world’s largest quantum research facility. China has also been in the forefront of quantum research, being the first to create a quantum communications satellite and quantum encryption technology (Growing Australia’s Quantum Technology Industry - CSIRO, 2020).  4) Companies that employ quantum researchers includes IBM, Intel, Google, Microsoft, Amazon, Lockheed Martin, CSIRO, Archer, Q-CTRL, Silicon Quantum Computing, MOGlabs, D-wave systems, NASA, Quantum Brilliance, Rigetti Computing and QuintessenceLabs. There is a steady number of new venture capital research companies that will emerge and take advantage of this new technology *(ltd, 2020).*   5) Governments all over the world, from the United States, to the UK to Australia, are laying the foundations for a future [quantum internet](https://theconversation.com/quantum-internet-the-next-global-network-is-already-being-laid-131355) (Ananthaswamy, 2020). |
| **Bartlomiej Kubiczek**    **Robotic Process Automation (RPA) Developer**  After conducting further research into the industry, I have found a limited number of jobs in comparison to other IT fields. However, this field has a very high long-term potential when it comes both to business and career opportunities. According to (Office of the Chief Economist, 2015) it is estimated that 44 percent Australian jobs are highly susceptible to automation. In my personal view this new progressive field is much more appealing and is guaranteed to last for the remainder of my lifetime. | 1) More employees are being replaced by machines. It is estimated that 44 per cent of Australian jobs are highly susceptible to automation, as industries modernise their workforces. In America, researchers predict 47 per cent of jobs will be automated by 2030 (Mechanical Boon, Department of Industry, Innovation and Science, 2018).  2) The worldwide Robotic Process Automation Software market grew 63% to $846 million in 2018, making it the fastest-growing segment of the global enterprise software market. The top 5 RPA software companies include UiPath, Automation Anywhere, Blue Prism, NICE and Pegasystems. It is predicted that RPA software revenue will reach $1.3 billion in 2019 (Gartner Says Worldwide Robotic Process Automation Software Market Grew 63% in 2018, 2020).  3) Intelligent Automation: The RPA market, while only $250 million in 2016, is estimated to grow to $2.9 billion in 2021. With advancements in AI, RPA will be able to evolve from exclusively focusing on rote tasks, to more complex ones. There will be an increased AI presence in the digital workforce (The RPA Market Will Reach $2.9 Billion By 2021, 2020).  4) In Australia, the number of people working as Industrial, Mechanical and Production Engineers stayed about the same over 5 years: from 30,200 in 2014 to 30,100 in 2019. This does not account for statistics due to Covid-19 (Industrial, Mechanical and Production Engineers, 2020).  5) Before the Covid-19 pandemic, automation had been slowly replacing humans in a wide range of jobs, from call centres to grocery stores to warehouses, as business looked to reduce costs and improve profit margins.  But labour and robotics experts now say social-distancing, which may continue for some time even after the virus has subsided, may encourage more industries to accelerate their automation capabilities (Robots Welcome to Take Over, as Pandemic Accelerates Automation, 2020). |
| **Bryce Thomson**    **Game Developer/**  **Architect**  My original idea of my ideal job was a bit mixed. It was Game developer and Technical Architect. I like the gaming aspect due to my hobby, but after looking at job prospects and burning glass data, I have changed my goal to be solely working towards the job of a Solutions Architect.  The same reason as before, SA’s work from multiple perspectives including business, information and technologies to resolve solutions. It will require an understanding in a broad range of topics, an eye on the future and business sense. Solutions Architects are given a lot of managing responsibilities and layout plans for departments to follow. If a company needs to progress their technologies, I would decide on how to implement them and maximise the benefits.  I did not realise that it led to the top-ranking job on Burning Glass (Solutions Architect), nevertheless I like the idea to be given a problem or idea, figure it out, implement it and help integrate it into the company. | 1) Solutions Architect was ranked as the number one most in-demand job title and the second most in-demand job in the Information Technology sector. (Labor Insight Top Titles - Burning Glass Technologies, 2018)  2) Solutions Architects continue to be an in-demand job in businesses, serving as consultants to their clients, offering specialised skills in designing and integrating information systems and optimising a company’s software portfolio. As more companies move to the Cloud, architects will help build the digital infrastructure and assess vulnerabilities in this new environment (Solutions Architect Career Path - Hired, 2020).  3) In Australia, the predicted growth for Solutions Architect jobs is 23.4% over the next 5 years (How to become a Solutions Architect - Salary, Qualifications & Reviews – SEEK, 2020).  4) Companies that are hiring Solutions Architects includes Cisco, Elastic, Innodev, AWS, Telstra, The Network IT, Rio Tinto, Department of Defence, Experian and Zoom. Fortune 500 companies and world class brands such as Guinness, Walt Disney, and Universal, all require the services of architects to improve their digital strategies and create comprehensive product roadmaps Glassdoor advertised 55,000 Solution Architect roles in August 2020. (Solutions Architect - Glassdoor, 2020).  5) Solution Architecture is a key component of any enterprise, delivering value by finding solutions and requirements for software, solution options (e.g. through RFIs, RFPs or prototype development) and solutions for building and implementing plans (Solution Architecture Tool Kit: Overview, 2020).  6) The number of people working as Game Developers stayed about the same over 5 years from 690 in 2011 to 650 in 2016. This is a very small occupation. Most game developers work in the field of education, science, information media and telecommunications. Game developers work with animators and illustrators to creates digital animations, images, video clips, and internet applications using a range of software, tools and programming languages such as Java, Python, C, C++ and C#. (Game and Multimedia Developers - JobOutlook, 2020).  7) Some companies that hire game developers include Nintendo, Valve, Sony Entertainment, UbiSoft, Sega and Electronic Arts. Companies in Australia include Acheron Design, Krome Studios, Redtribe, Tantalus Media and Torus Games (Grande, 2020). |
| **Chloe Bradley**    **Chief Technology**  **Officer**  I’ve been working in the IT industry for about 14 years now. I started in education working for a university and have now moved on to working for a VCMS. My experience in these roles has helped me define where I would like to end up, a role as Chief Technology Office or Chief Operating Officer, maybe even CEO of a tech company one day.  The industry data only solidifies this as the correct move for me, IT is a fast paced every changing atmosphere that can really challenge you but also give fantastic rewards.  Being at the forefront of technology, watching companies explode and take the world by storm. That is what I want to be there for. | 1) The number of people working as Chief Information Officers grew very strongly over 5 years, from 2,000 in 2011 to 3,800 in 2016.  (Chief Information Officers - JobOutlook, 2020)  2) Information technology is the core of today’s businesses, and someone needs to manage it. Chief Technology Officers are needed by large and small businesses alike, to take charge of all their technology and technological resources. The chief technology officer establishes the company’s technology vision, creates strategies and coordinate execution of plans. They supervise the informative systems to ensure data, software and hardware is optimised and secure (Editors, 2020).  3) In Australia, the future growth prospects for Chief Executives are 0.7% in the next 5 years. The projected employment level in 2024 is set to be 31,000 (Welcome to the Labour Market Information Portal., 2020).  4) As technology becomes more ingrained in our increasingly complicated world, the CTO role will need to evolve to match the pace. This can be challenging, but the ability to build smart teams to meet complex goals is a quality that will remain in high demand by many organisations (Samuels, 2020). |

**2) From your group's ideal jobs, you can identify a set of skills required for these jobs.**

|  |  |
| --- | --- |
| **Group’s Required Skill Set** | |
| **General Skills** | **IT Specific Skills** |
| * **Research and development.** * **Problem Solving** * **Writing** * **Articulate** * **Analytical** * **Teamwork/Collaboration** * **Communication** * **Organisation and planning** * **Leadership** * **Mentoring** * **Time Management** * **Troubleshooting** * **Detail-orientated** * **Building relationships** * **Presentation** * **Creativity** * **English fluency** * **Team building** * **Quality Assurance and Control.** * **Meeting deadlines.** * **Self-Starter** * **Multi-Tasking** | * **Mathematics, statistics, physics and chemistry knowledge.**      * **Programming languages: Python, C, C++, C#, JAVA, JavaScript, Swift, Go.** * **Software engineering** * **Systems engineering** * **Computer research experience.** * **Android and iOS mobile application development.** * **UI frameworks (Android, iOS, XML), MVP application design, complex and reactive touch base.** * **Game design using Unity, Unreal Engine and SDK development.** * **RPA software experience (Automation Anywhere, Blue Prism, UiPath).** * **Systems Architecture and API experience.** * **Cloud and Systems Security knowledge.** * **Business Analysis** * **Project Management** * **IT sales experience.** * **Customer Service** |

**3) How do the IT-specific skills in your required skill set rank in terms of demand from employers and what are the three highest ranked IT-specific skills which are not in your required skill set?**

The programming languages required for our ideal jobs include JAVA and JavaScript, which were ranked as the second and third most demanded skill in the IT industry (Labor Insight Skills in Greatest Demand - Burning Glass Technologies, 2018). JavaScript is primarily used by web developers and graphic designers. Where HTML and CSS are languages that give structure and style to websites, JavaScript gives websites interactive elements, making it user friendly. User interface (UI) design also comes into play here. UI design is needed by most companies that have a digital presence. The job of Google UI software developer will require a strong ability in these skills. With the growth of the internet and users, which is estimated to be 4.5 billion in 2020, the demand for more advanced JavaScript and UI design skills will increase in tandem (Global digital population hits 4.5 billion, 2020).

JAVA is used to program a wide variety of products and services, including games such as Minecraft, supercomputers, datacentres and even NASA’s Mars Rover (Reuters, 2020). Java’s popularity is primary due to the exhaustive testing and refinement it has undergone for the last 25 years by a dedicated community of software programmers (Oracle, 2020). Out of the estimated 700 programming languages, Java remained the top programming language and will continue to be a highly demanded for many years, however there has been a surge in the use of Python in recent years. The simple and elegant design of Python makes it well suited to the unique demands found within machine learning (ML), automation, Internet of Things (IoT), and cloud first software development. Python was demanded by IBM for Quantum research and is used to program their quantum computers on Qiskit (an open source software development kit) and Jupyter Notebook. The C languages have also been requested as a prerequisite for gaming, solutions architecture, quantum computing and software engineering. Google’s Go language is also another skill that their future employees may need to possess (The Go Programming Language, 2020).

The most demanded skill was knowledge of SQL, which stands for Structured Query Language. This skill is not in our group’s required skill set. However, it is an ability that employees across all domains will require many IT professionals to understand. According to research by IBM,90% of the data in the world today has been created in the last two years alone, at 2.5 quintillion bytes of data a day (IBM software HP, 2020). That data is held in databases and needs to be retrieved by companies to develop and plan their products and services. SQL lets a programmer access and manipulate databases. SQL is required to use relational database management systems (RDBMS) such as Oracle, Microsoft SQL Server, IBM DB2, Teradata and Sybase (DB-Engines Ranking, 2020). RMIT offers a short online course on SQL.

Link: RMIT SQL: <https://www.rmit.edu.au/study-with-us/short-courses/courses/s650194-structured-query-language#overview>

Knowledge of SAP software was considered highly desirable in the IT sector. Our group did not have SAP listed as a required skill. SAP stands for System Applications and Products in data processing. SAP software provides helps companies manage complex business processes, with different departments, allowing employees to gain access to real-time insights across their company (What is SAP? - SAP Software, 2020). This ultimately benefits workflows and increases efficiency, productivity and customer service.

Project management was listed as the fifth most in-demand skill. The ability to work in a team and coordinate tasks is the foundation of any company’s success. This rare skill is part of our group’s required skill set. The prerequisites to become a successful team leader is not just a high level of organisational and technical knowledge, but also a high degree of social intelligence. The individual must exhibit empathy and become attuned to others’ moods and feelings, as human beings are emotional creatures (Goleman, 2011). The project manager’s ability to understand and organise humans to work cohesively without conflict is often rewarded with larger salary packages due to the complexities involved.

Employees are also searching for people with skills in Microsoft Windows and Office. It’s become an industry standard platform to work on. While this skill wasn’t specifically requested for any of our ideal jobs, our group does possess a strong understanding of the tools and applications in Windows including Word, Excel, PowerPoint, Teams and OneDrive.

Our group’s required IT skill set also includes other in-demand skills including business analysis, systems engineering and customer service. Overall, our required skills are what employees are looking for across the IT sector. We need to develop more skills related to SQL and SAP, whilst also improving our ability to use Microsoft Windows and Office.

**4) How do the general skills in your required skill set rank in terms of demand from employers and what are the three highest ranked general skills which are not in your required skill set?**

All the in-demand general skills are part of our group’s required skill set. All the companies demanded the top three general skills in their job advertisements. They are looking for individuals who possess a high level of communication skills (articulate and effective English), a proven ability to problem solve and a high degree of organisation. Three of our group’s ideal jobs are in multi-national billion-dollar companies, including Google, IBM, Automation Anywhere. Competition to enter these companies is fierce and as a result, they will only take the most qualified individuals that possess not only knowledge and experience in technical skills, but also a number of general skills.

The ability to communicate effectively was ranked as the number one general skill employees are looking for in any IT professional. Writing and verbalising ideas in an articulate and positive manner is a fundamental skill in the science and computer industries, especially as they deal with complex and difficult technical projects on a daily basis. Teamwork and collaboration cannot happen without smooth communication. This requires that individuals listen carefully, speak honestly and clearly, be confident and respectful, manage their emotions, give criticism constructively without causing offence and put others at ease.

This also requires a deep understanding of nonverbal communication, which is conveyed through body language such as facial gestures, body position and tone of voice. In today’s job market, professionals who possess these valuable attributes will have a competitive advantage over other highly technically skilled candidates.

It will be beneficial for our group to invest time, energy and money into courses that will help increase our communication skills including our social and emotional intelligence. The professional development training company Dale Carnegie offers a range of online courses on topics such as “How to Communicate with Diplomacy and Tact,” “Present Complex Information” and “Successful Public Speaking” (Self-Awareness: Leading with Emotional Intelligence, 2020). Investor Warren Buffet credited the Dale Carnegie course as the key factor in transforming his life and creating billions; “This $100 college course gave me the most important degree I have and it’s why I’m successful today. I don’t have my university degree or diplomas hanging on the wall, but I have this one.” (Gillian Zoe Segal, 2020).

Problem solving was listed as the second most in-demand general skill. The ability to find solutions to technical problems is the primary job of any IT-professional. Understanding the software capabilities, debugging code, testing and running programs are part and parcel of software programming, automation, quantum research, solutions architecture and management. However, the general skill of problem solving refers to the ability to handle difficult or unexpected situations in the workplace. Individuals who have the ability to calmly access a problem and create solutions are highly valuable to any organisation. This skill requires learning to make logical decisions (critical thinking) under pressure, researching and active listening. This capability is particularly useful for Chief Technical Officers and Solutions Architects, as they are leaders in their organisation and must take the responsibility to find quick solutions when problems arise. Being an excellent problem solver will make candidates stand out among the crowd, as IT companies are constantly looking for people who are trustworthy and dependable in all types of situations (Career Advice - Indeed, 2020).

Another important general skill to possess is the ability to organise and plan. This involves prioritizing tasks that must be completed immediately, versus those that can be postponed, delegated to another person, or eliminated altogether. Organisation was listed as the third most highly demanded general skill and is a quality all our group’s employees requested. For software programmers, this ability should come naturally, as algorithms are based on the ability to organise structures and create the most efficient route. For quantum research, the ability to organise data and create peer-reviewed research papers requires a great eye for detail, an understanding of critical and analytical thinking, as well as thorough planning. Working in a team on complex scientific problems can only be achieved by delegating tasks and reaching goals in a timely manner. Without structure and order, productivity is slow, if at all existent, and the company’s profitability will suffer. Therefore, all companies are searching for employees that have exemplarily organisational skills.

Our group’s required general skills also include the ability to lead, troubleshoot, build teams, present, meet deadlines and assure quality and control of products and services. Overall, while studying a formal qualification through RMIT, our group can secure our dream roles by ensuring we’re constantly working on building general skills that will make us an asset to any team. The most important of these skills is communication – the art of connecting with other employees and collaborating towards common goals.

**5) Having looked at the Burning Glass data, has your opinion of your ideal job changed? Why or why not?**

**Cintia Michel**

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**Cintia Michel**

**Ideal Job: Software Engineer**

**Industry Demand:**

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**Dhilrukshi Pathmanathan**

**Ideal Job: Quantum Researcher**

**Industry Demand:**

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