

The Cost of Cloud Computing to Small Businesses

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Spring, 2021

On my honor as a University Student, I have neither given nor received
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Introduction

Cloud Computing began as an idea in 1964 by DARPA (Defense Advanced Research Projects Agency) to let more than one person use a computer simultaneously. Since then, it has exploded into data centers all across the world with the ability to use many computers at the same time in a matter of seconds. Thus, the ability to expand one's resources has been greatly expanded while also becoming a fraction of the cost. The price of a simple instance (a term to denote a virtual computer) on Amazon's Web Services (AWS) has decreased from \$0.40 an hour to \$0.0175, giving the ability for anyone in the world easy access to a powerful machine (Supernor, 2018). This has changed computing, and for many reasons, this may be the greatest human accomplishment of the last 50 years.

However, while the benefits are substantial on an individual level, the market changes as the number of resources needed increases. It is currently estimated that Netflix spends \$9.6 million dollars a month just for using AWS, amounting to over \$115 million dollars a year (Netflix Cost). While this allows Netflix to provide a reliable stream to anyone all across the world, it has come at a significant cost that many small businesses could not accept. Due to the everchanging definition of how big a small business is, this thesis will consider a small business that is small compared to the larger corporations within their industry. While it is understandable that a small business would not need this number of resources, it brings up the larger question on how Cloud Computing has widened the gap between small businesses and large corporations. There are a number of factors that directly matter to customers, including the response times and the reliability of a website/service. This thesis will examine how Cloud Computing has impacted these factors over time and offers suggestions on how to reduce inequality in the future.

Methodology

This paper uses an analysis of literature from both a technical perspective and from a social perspective to best understand the relationships between the Cloud, Cloud Providers, and Cloud Customers. In many ways, there is an everchanging relationship between the growing cloud and the prices that providers charge their customers. Given the recent nature of this field, there is not much research regarding the social and economic relations that small businesses face when engaging in the Cloud market. Given the massive expansion of the Cloud in general in the last decade, the effects have yet to be greatly studied. Thus, this thesis will utilize very recent papers and research to examine the current state of these relations. Some information from the technical report will be utilized since the pricing strategies that providers use is important in how small businesses enter the industry. A deep analysis of how the history of the Cloud has impacted the current state of the industry will be conducted. This will further lead into how the current state of the Cloud is flawed and will give further feedback on improving in the future.

Literature Review

There is a small number of Cloud Providers that provide most of the computing resources to companies in the United States. While many providers do not breakdown their market share by country, AWS, Google Cloud, and Microsoft Azure account for over 61% of worldwide cloud infrastructure revenue (Richter, 2021). This means that pricing strategies can be viewed as a Duopoly market, minimizing Google Cloud's impact given the minimal 9% market share. This has been studied many times with the outcome usually the same: constant prices with brief price wars (University et al., 2016). Regardless of the current market, cloud computing can be a lucrative business for small and medium sized businesses if utilized properly (Aljabre, 2012).

While the market for large corporations has already been proven, small businesses may have the most to gain from their use in Cloud Computing (Aljabre, 2012). Thus, while the business impacts of adding Cloud have been shown, a small majority (55% of small businesses agree that it is also cost effective (Alijani et al., 2014). A Deloitte study commissioned by Google found small businesses grow 26% faster and deliver 21% higher profits (Deloitte, 2014). This has been especially shown with the rise of startups, as they can rapidly scale up in minutes and make significantly more profit than what was achievable before the Cloud. Thus, the market and lucrativeness of Cloud Computing has been shown. However, there are increased risks when a small business moves to the cloud including hijacking of account passwords and confidential information (Hutchings et al., 2013). There is also the major risk of sudden termination because it is not intuitive to quickly switch providers (Kleyman, 2019). This is especially a risk to small businesses because of the minimal IT budgets that these businesses have. Therefore, small businesses must balance their needs with the added risks.

The History of Cloud

The origins of Cloud Computing can be traced back to a MIT project in which the term “Virtualization” was described in which a computer can serve two or more people simultaneously (Foote, 2017). However, this was with respect to memory tape that old computers used, not the current belief of what a “computer” is. The first real use can be traced back to 1999, where Salesforce offered software online for the first time. Something people now use billions of times daily is a foundational step in Cloud’s growth. The moment in which the history of computing would be changed forever is when Amazon launched Amazon Web Services (AWS) in 2006 with their EC2 platform. EC2 let anyone create a virtual instance to run their own programs and applications. At this point, Amazon was not profitable, and its leadership saw their

own experiences in databases and virtualization as a pathway to the future. Running their own data centers, they were already very skilled on how to make this as efficient as possible (TechCrunch). The biggest current competitor, Microsoft Azure, wouldn't launch until the early months of 2010. This gave Amazon almost 4 years to build a customer base and develop a reputation- and they did exactly that. They launched S3, a storage solution that can dynamically increase, and built close relationships with new company Dropbox and struggling corporation Netflix (MediaTemple). Since then, Amazon has dominated the public cloud, consistently adding new features as Cloud naturally expanded. It is important to denote the three different types that Cloud providers provide- IaaS, SaaS, and PaaS. IaaS, infrastructure as a service, is an option for customers to buy computers, networking, and storage in a Pay-As-You-Go fashion. SaaS, software as a service, is essentially what Salesforce did in 1999, providing software through the internet. PaaS, platform as a service, provides the tools necessary to build software through a universal platform with easy scalability (Watts & Raza, 2019).

The Importance of Cloud

It is believed that 94% of the internet workflow will be processed by the cloud (TechJury, 2021) ensuring that businesses either will need to buy in or be left behind. Thus, even the smallest businesses are transitioning to the cloud in some capacity, including for storage capacity or for servers. 82% of companies surveyed have said they have spent less on this need now than before transitioning to the Cloud. Therefore, it is obvious that there are significant cost savings that even the smallest of businesses can take advantage of. But at what cost? In some cases, providers sign exclusive contracts with major corporations called Service-Level Agreements (SLA). This is meant to ensure a specific level of service, such as improved reliability or improved security (Overby, 2017). This means that the larger corporations will be prioritized

over the small businesses in situations of large demand and low capacity. There is also the threat of external security threats. In 2019, as Capital One was transitioning away from in house data centers to Amazon Web Services when a massive data breach shocked the cloud landscape (Corstorphine et al., 2020). Essentially, a misconfigured user profile gave permissions that should not have been allowed, and user data was retrieved before this was found and stopped. By being connected to external servers, there is always an increased risk due to having data on the internet. However, I would argue that smaller businesses have more to lose from a breach like this. The normal IT budget for a small business is around \$150,000, meaning that the ability for actual humans to monitor and prevent situations like this is minimal to large corporations with large budgets. While there would still be a risk without the cloud, the risk is increased and more likely to be acted on. However, the very nature of the cloud being scalable supports all businesses, so there are definitely tradeoffs.

The Future of the Cloud

The simple truth is the Cloud is the only pathway for future businesses going further. Customers expect nothing but the fastest response times with the inability to wait for further information as attention spans continue to decrease. Therefore, businesses will have to provide the best service in order to grow their brands as private data centers continue to decrease across the country. While this thesis reflects solely on how the Cloud has impacted the United States market, it is interesting to note that businesses in the other parts of the world have been slow to adopt the technology. Only around 33% of businesses in the European Union have adopted some form of the Cloud (Alijani et al., 2014), so I would expect that number to rise dramatically. Historically, the United States tends to adopt the newest technologies before it spreads to the rest of the world so I would expect the same. While there are major differences in how the Cloud

impacts small and large businesses, I can easily see those differences being minimized in the future. For example, Cloud is a very lucrative business for providers and there has been an increase in providers over the last five years. This means that there will be an increase in competition and a decrease in price. In the technical report, I noted a phenomenon called “price bidding”, where customers are able to list what they need, and providers can bid on providing to the customer. As the number of providers increases, the price bidding will expand further and decrease prices. Furthermore, the feature set that each individual provider has been increasing steadily, meaning that even the cheapest providers should still be able to provide a reliable service with the security that even small businesses need. SLAs are a good thing overall and they aren’t necessarily meant to harm smaller businesses that can’t afford that level of guarantees. Large corporations are under a tougher scrutiny and any downtime can mean millions of dollars of lost revenue. Therefore, I believe the path for smaller businesses rely on the natural market bringing on further competition and lowering the prices rather than the elimination of the SLAs.

Importance

This topic has significant importance because of the amount of people who use it each and every day. Anyone who uses the internet uses the cloud in some fashion, so seeing how the infrastructure is set up and seeing how the providers bring in customers is very interesting. Since there are only a few providers, these providers hold an extreme amount of power. A small business who relies on the Cloud can have their whole infrastructure ruined in a matter of moments. In a recent example, Amazon revoked Parler’s ability to use AWS and both Google and Apple revoked the app’s ability to be on their respective app stores (Fitzpatrick,2021). Regardless of the reasons for the app’s removal, there is no denying the impact that this decision made for both Parler and even every other Cloud Provider. Parler was essentially removed from

the internet in a day, and it took weeks before a cloud provider was able to bring their platform back online. Parler is a highly controversial application, but imagine if this happened to a bigger platform, like Capital One. One single Cloud Provider can singlehandedly ruin a corporation or at the very minimum delay their operations. While many large organizations can sustain this and have the public visibility and support that would prevent the situation in the first place, small businesses do not have this luxury. Therefore, I'd argue that all customers deserve a transitional period from when a provider is no longer willing to provide services to when a customer can completely integrate with a new system. This is mostly to protect small businesses, but even large corporations would benefit from this level of protection. For many reasons, cloud providers are becoming the gate keepers of the internet. This is significant and dangerous, but it has become the norm to give control over your information to these companies. However, the benefits are too good for a company to refuse to transition, thus this is an issue that will be more prevalent in upcoming years.

Conclusion

Cloud has brought incredible advances to the online economy and allowed anyone with a connection to quickly access information worldwide. This has brought significant changes to the internet landscape as businesses across the United States adapt. Luckily, the changes have greatly benefitted both small and large businesses, with pricing not being a limiting factor for a majority of the businesses that use the services. The cloud has significant benefits and drawbacks, but at this time of rapid change, companies are thinking about the benefits first and the consequences at a later time.

Overall, the expansion of the Cloud has been very beneficial to small businesses and has allowed for the popularization of many small businesses due to exposure and overall better reliability. The prices are fair, but there is still a level of competition that is yet to come. The SLA model is essential for large corporations, but this does come at a cost to smaller businesses who are unable to afford this level of service. The biggest threat to the future of Cloud and the willingness of small businesses to move to the cloud is the power that the providers have and ability they have to control their operations. Consequently, more protections must be provided giving customers the time to transfer to a different provider if a termination must occur. Therefore, there will always be the need for local servers because there will always exist companies who can't rely on the Cloud and thus would be better served through their own solution.

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