Google’s Cloud Computing Platform Adoption

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# Abstract

Cloud computing is an online collection of services and resources that allows the user to forgo hardware and software installation. Google is the cloud provider and the consumer is a medium sized clothing retailer. Google Cloud Platform is a public cloud that is available for use by the public while under the ownership of Google. Google Cloud Platform benefits from being developed by Google due to their enormous amount of resources and money at their disposal, and by having years of experience in the IT field. The three delivery models available are serverless computing, platform as a service (PaaS) and infrastructure as a service (IaaS). They each provide the consumer with varying ways of making use of the services provided but can be combined to mix their unique features. A prevalent issue with cloud computing is about the trust that the consumer places within Google, believing that they are able to provide the necessary security for their sensitive data. Google greatly benefits from using cloud computing as it eliminates the need for installing software and maintaining security for individual computers, and by reducing the amount of networking hardware needed as they are available as services on the cloud. The consumer’s needs consist of a method of developing a web and mobile application, as well as storing the data of their customers, employees and employers. The consumer would be better off using Google Cloud Platform over AWS as the cost of operations is more affordable.

# Introduction

This report will contain a background of what cloud computing is; however, the primary focus will be on the adoption and utilisation of cloud computing technology in the domain of a retailer. The aspects of adoption that will be covered in this report involve infrastructure and technology, delivery models, issues and challenges, the impact on stakeholders, and consumer needs and specifications. Google will be used as the cloud provider with their service “Google Cloud Platform”. The consumer will be a medium sized clothing retailer. A comparison between Google Cloud Platform and Amazon Web Services (AWS) will be made while determining which provider is better suited for the domain.

# Background

Cloud Computing is a collective service that encapsulates many computing resources including storage, security, networks, application software, databases, servers, etc. This allows for fast and easy access to any resources and services that a user may need through the internet without the need for one off payments and installations. Using the cloud requires little communication with the service provider (Mell & Grance, 2011).

There are four models of deployment for cloud computing, private, community, public and hybrid. Google Cloud Platform is categorised as a public cloud model as it is available for use by the general public while staying under ownership of a private company, with that being Google (Krishnan & Gonzalez, 2015; Mell & Grance, 2011).

# Discussion

## Infrastructure and Technology

Google Cloud Platform benefits from being developed by Google due to their enormous infrastructure that is also being used for all of their services including Google Search. Google’s infrastructure is one of the most wide-ranging networks across the world, this allows them to fully support and maintain their cloud network for all the consumers. Their infrastructure has plenty of resources to allocate between Google Cloud Platform and other services (Krishnan & Gonzalez, 2015).

Google Cloud Platform offers consumers a variety of more than 90 services, their major services include app engine for app development, compute engine offering virtual machines, cloud storage for storing objects, and cloud SQL offering MySQL and PostgreSQL databases. The services on offer can be used individually or in unison with the other services. Automatic scalability based on traffic is a function of numerous services that reduces the cost of deployment and improves their efficiency in use (Google, n.d.-b; Orvas, 2018).

Various storage services on Google Cloud Platform can be used in conjunction with Google App Engine such as Google Cloud SQL and Google Cloud Datastore with the former serving MySQL and PostgreSQL, and the latter being a schema less database (Google, n.d.-a).

## Delivery Models

Google Cloud Platform offers three delivery models, being Infrastructure as a service (IaaS), Platform as a service (PaaS) and Serverless computing. Serverless computing is presented through the service Google Cloud Functions, which is also known as a Function as a service (FaaS). Google Cloud Functions offers a serverless environment that allows users to execute various cloud services by attaching functions to an event (Google, n.d.-a).

PaaS is presented through Google App Engine; resource management is handled through Google allowing the user to focus on the tasks at hand without needing to concern themselves with how their resources should be used. An example involves automatically scaling resources based on the incoming traffic to an application. A wide range of languages can be used for building applications through either the standard environment or flexible environment runtimes. Standard includes Python, Java, Node.js, PHP and Go, flexible includes those languages as well as Ruby and .NET. A custom runtime could also be implemented to allow for any other type of language to be used (Google, n.d.-a)

IaaS is presented through Google Compute Engine, it provides a complete and extensible infrastructure to be used for any purpose. The infrastructure is provided by a Virtual Machine (VM) which simulates a real-world network infrastructure, and so all of the resources must be configured and managed by the user. This can be beneficial when a more specialised network environment is needed that cannot be achieved by PaaS. Google Cloud Platform does allow the merging of any of the above services to make effective use of their separate functions. (Google, n.d.-a)

PaaS would be the better choice for the consumer over IaaS, as the consumer would not need to make use of a specialised network environment.

## Issues and Challenges

Due to the enormous nature of a public cloud it requires a large amount of monetary backing to maintain, and so organisations such as Google usually run them. A survey done by (IDG Communications, 2018) shows that “The average cloud budget is up from $1.62 million in 2016 to $2.2 million today” and “by comparison, enterprise organizations (1,000+ employees) average cloud spend has risen just 15% to $3.5M”.

Lane et al., (2017) devised a table that maps out the responsibility of security and privacy concerns for cloud services between the client and cloud service provider. The sources used for this table include Amazon, Microsoft, IBM and Techtalk, and so these findings would also prove relevant for Google. With regards to the consumer, PaaS would be used, and the sole responsibility of the client involves data governance, endpoints protection and user access management. Joint responsibility involves identity infrastructure, application and network control, while sole responsibility of the cloud service provider involves OS security, hosting, network and the data centre.

A prevalent issue with cloud computing is trust, the consumer places a significant level of trust within Google that their data will be protected. And so, if the consumer stored their data in Google Cloud SQL, Google will ensure that their security measures are in order to protect that data. (Sharma, & Trivedi, 2014). Considering the enormity Google’s infrastructure and resources, and how frequently their services are used, the consumer would be able to place greater trust in them than a smaller cloud service provider.

## Impacts on Stakeholders

Stakeholders consist of the individuals and organisations that are directly affected by the implementation of cloud computing. They can include consumers, employees, corporate owners, employers, governments, providers and vendors. Governments are required to stay up to date with constantly evolving technology as a means to develop laws and regulations that other stakeholders will need to follow when involved with cloud computing (de Bruin & Floridi, 2017).

Large organisations like Google can benefit by reducing the price of implementation and maintenance for software across all of their computers, with this process needing to be done individually. This is due to the easy access of software on the cloud that only requires users to operate an account. However, for smaller organisations this benefit is not as apparent with them having less computers to work with but the difference in cost between one off payment and pay as you use could still be positive for smaller companies (de Bruin & Floridi, 2017).

Stakeholders that are not as prevalently affected by the implementation of cloud computing involve people and organisations whose data is stored in the cloud by business’ that they cooperate with. An example being that users of Google Cloud Platform could have their account information stored in Googles cloud database (de Bruin & Floridi, 2017).

## Consumer Needs and Specifications

The medium sized clothing retailer would use PaaS for the management of their web and mobile applications as Google would handle all of the backend resource management associated with hosting applications. Security for the applications would also be handled by Google along with any updates that that are available. If any changes need to be made to the applications, Google App Engine provides the necessary software to suit this need. Google Cloud SQL would be used for storing customer, employee and employer details, as well as keeping track of stock. Services such as email, drive and other Google services would be useful due to their interconnectivity.

## AWS Comparison

According to Keshavrao (2018) a disadvantage of Google Cloud Platform is their lack of features and services present, while AWS has a larger quantity of features and services available and produces new features and services at a faster rate than Google Cloud Platform. A table devised by Hyseni & Ibrahimi (2017) shows that in 2016 AWS had a total of 74 services while Google Cloud Platform had only a total of 52 services.

An advantage of Google Cloud Platform is that their cost of using is based on computing and the consumers requirements, which is lower than AWS who also have a higher operational cost overall. Google Cloud Platform has more comprehensive security than AWS as Google’s security was built over a decade ago and has been constantly improved and maintained since then, while Amazon has not been as prevalent within the IT industry.

A table devised by Joshi & Shah (2018) shows a slight difference for the PaaS cloud computing environment between Google Cloud Platform and AWS with that in-memory database storage is only available for AWS.

Although AWS provides a higher quantity of services, Google Cloud Platform provides all the necessary services that the consumer would need, alongside a lower cost of operations compared to AWS.

# Conclusion

In conclusion, Google is a more than adequate cloud provider for the consumer in question. Google Cloud Platforms PaaS, Google App Engine, provides the necessary software for developing and maintaining, desktop and mobile applications while Google handles all of the backend hosting and security responsibilities. In comparison to AWS, Google Cloud Platform will also deliver the consumer a lower cost of operations. And finally, the consumer will be able to place their trust into Google in handling and securing their data, with the amount of money and resources that Google devotes to Google Cloud Platform.

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