Cloud Foundations Milestone 1 Case Study

# Task 1

## Cloud Implementation Model

The school should implement Platform as a Service (PaaS) as a model for the cloud implementation. Since the current server infrastructure is working on an old operating system, it is recommended to use PaaS to concentrate on building the software without having to worry about operating systems, software updates, or infrastructure (Watts, S. & Muhammad, R. 2019). PaaS allows focus on building the school library application into the cloud infrastructure which functions like the school’s desktop computers that enables to search and read the digital assets for access outside the school. Since the school’s current server infrastructure is dated because it is runs on the Windows 2000 platform, using AWS with PaaS as a model will ensure the online infrastructure will always be up to date with no extra cost to upgrade and maintain.

## AWS Services

With the model of the cloud implementation selected, the school needs to consider which AWS services will be useful. The services selected need to address the unfunctional library that lack features of search, security or access mechanism for out of the premise usage. The following services address these issues for the library.

To ensure security, Gibraltar created a virtual private network connection between Amazon Elastic Cloud Compute (Amazon EC2) and the school computers using Amazon Virtual Private Cloud (VPC) (Amazon Web Services 2014). From what Gibraltar achieved, the Melbourne school can implement a similar connection using Amazon EC2 as a replacement for the library computers because it acts as virtual machines in the cloud. In addition, Amazon VPC allows access to an isolated virtual network for secure access to the library to identify each user via IP address and prevent unauthorised access to the computers.

The school in Melbourne has a total of 5000 students from four different districts and employs 450 staff members, but the staff should have more control in the infrastructure. Therefore, the service AWS Identity and Access Management (IAM) is an essential free service that enables the customer of AWS to manage users and permission levels for users requiring access to AWS (Trend Micro Cloud One n.d.). AWS IAM can use groups to assign permissions to the students and teachers. Teachers should have more permissions to add or remove students from their classes and add more learning resources for teaching. In addition to teachers, administrators are required to maintain the infrastructure. They are responsible for creating user groups, policies and security of the infrastructure as well as the permissions the teacher group have. Because these tasks are important to the functionality of the infrastructure, IT staff are the only ones responsible for administrative features.

To store the digital assets the school library has, the service Amazon Simple Storage Service (S3) need to be included in the infrastructure. Amazon S3 is a simple storage service to host and protect the digital library assets. These files are accessible by both students and teachers for education purposes in and out of school. Moreover, these files can simultaneously be open by many users at the same time, so the files are readable at any time.

However, the library cannot function in its current state, even though the assets are inside the storage. Amazon Relational Database should be considered as a service to store and organise data for the digital assets and search for books and papers. The field names for the books should include the unique identifier, title, author(s), data published, publisher and whether the book is currently being borrowed. The details are useful for staff and students to search the correct book and check the status of physical books to ensure it is inside the library.

## Cloud Implementation Cost

To assume the cost to implement the cloud infrastructure for the school, AWS Pricing Calculator will be used to estimate. All prices are from Asia Pacific Sydney servers for being the closest to Melbourne.

The school has four different districts in Melbourne. There is apparently one school library with around 20 computers to use. Therefore, there should be around four Amazon EC2 instances to cover the districts. It is running on Windows Server for similarity with the current Windows 2000 platform, although features may be different and advanced. For the main purpose of browsing the library, the instance should not be strong, thus there are 2 vCPUs and 8 GiB of Memory inside each instance. The Amazon Elastic Block Storage contains a General-Purpose SSD with the free 30GB included, mainly for database purposes. The total monthly costs total $269.90USD.

Amazon S3 will store digital assets for the library for students to read. The school library inventory currently is limited now; therefore, storage should be at 50TB to compensate the file sizes of the available digital books and papers and it may likely increase overtime. S3 provides the storage for $1250USD per month.

On the Amazon VPC, it charges for active client connections per hour and the number of subnets that are associated to Client VPN per hour. There are about 5000 students enrolled in four different districts and 450 staff members working for the school. Considering that only a portion which can be around 100 at each district use the cloud infrastructure at the same time and uses it about 10 hours while teaching and at home for the whole month, the total client VPN cost is $1,609.50USD.

For Amazon RDS for SQL server, it is a large database with 2 vCPU and 7.5 GiB memory to store the book details. The pricing model is on demand so only the unused data is not paid for. The storage has a general-purpose SSD with 100GB, in addition to 100GB backup. This calculates to $1,475.20USD.

Support is essential while working for AWS to ensure the infrastructure stays up. For the support plan, the school needs the business support plan which has 24/7 phone and email access with Support Engineers and a response time less than 1 hour which helps resolve quick issues and bring the library functional. The monthly support costs $460.46USD. Currently, the school hires a part-time junior system admin. However, it is more beneficial to hire a full-time system admin who usually has an average salary of $68,893AUD (Payscale n.d.).

Annually, the AWS infrastructure should cost $60,780.72USD by itself. However, it needs assistance from a system admin which totals into $147,481.98AUD.

# Task 2

## Benefits of Utilising Cloud Implementation and AWS Infrastructure

The Theatre would benefit from utilising Cloud implementation and AWS infrastructure because of their online presence on their website and booking system, in addition to managing being a national theatre chain with 100 cinemas for management. Airbnb is primarily lodging booking website that is used worldwide and functioning with AWS that allows property owners and travellers to connect with each other for the purpose of renting unique vacation spaces around the world (Amazon Web Services n.d.) which is similar purpose as the theatre because of the renting functionality can be like booking a seat in the theatre. To function like the mentioned websites, users would select the movie and location, reserve a seat, and pay. In addition, AWS provides a pay-as-you-go payment option, so the theatre chain can adapt the business depending on need and not on forecast, only pay for what it uses (Bishai, A. 2018). This prevents the theatre chain to not spend unnecessary expenses when the servers can handle the traffic spike, but it does not appear often. The payment model can also assist saving when traffic is low so unused capacity is not paid.

## Cloud Implementation Model

Due to the presence online, it may benefit the theatre to use Software as a Service (SaaS) as the model when implementing the cloud infrastructure. From what Watts and Muhammad listed, SaaS is most beneficial when there is a need to launch ecommerce quickly and do not have time with servers or software, applications are not need too often and both need web and mobile access (Watts, S. & Muhammad, R. 2019). The theatre chain was having issues with the traffic which AWS assists with payment options and focus on creation of the website. In addition, the only applications that are necessary is to view and book seats for theatre via the website, in addition to website administrative options.

The theatre chain is exploring the possibility of streaming new films to customers which has a similar service to Netflix. Netflix offers the software to stream licensed movies online through a subscription (Bhattacharya, J 2021) which the theatre should use as inspiration for the model when creating the streaming service, however subscriptions for new films are unlikely due to less profit to distributors. Rather than subscription, users can rent to stream the new films through the website.

## Regions

There are multiple benefits for the theatre chain to spread their AWS resources across two regions. One main reason is the ability to place the resources of the website closer to the end-users’ proximity which optimises the network latency. In most cases, if instances are distributed over multiple Availability Zones and one instance fails, the application can be designed so that an instance in another Availability Zone can handle requests (Nemer, J. 2019). The theatre chain needs to have at least two resources because their services are used throughout the whole country and give users low latency while using the website. In case of an accident in one region, the other one can handle requests to prevent downtime while booking a seat, in addition to act as backup in a situation whether data cannot be recoverable.

## Security Model

A recommended security model for AWS is the Shared Responsibility Model. The theatre focuses building the security with services AWS provide while AWS focuses on protection of the hardware that runs all services offered in the AWS Cloud. The customer of AWS would be responsible for information and data, application logic and code, identity and access, and platform and resource configuration (Cloud Security Model 2020). This model is recommended because this relieves the burden of AWS security in case it fails, and the theatre chain can focus on building the security of the application for customer details and payment details.

## AWS Services

From what is describe about the theatre chain, AWS services need to be chosen to satisfy the requirements for storing customer details and running of the application. Airbnb uses these services to meet the requirements because of the flexibility and responsiveness of AWS is helping to prepare for more growth (Amazon Web Services n.d.).

Amazon EC2 is a necessary service for creating instances that hosts the application. For demand, several instances must be used to meet demand of the traffic.

Amazon S3 would be suitable for the cloud implementation of the theatre chain. to store backup files and static files including movie posters. S3 is also used to store customer details when they are booking for movies. Amazon EMR is a tool for big data processing and analysis. This service processes and analyses huge amounts of data daily with the analysed data being helpful to create an algorithm catered to each customer depending on what films were reserved or viewed online.

To store data about the films the theatre chain provides, Amazon RDS should be considered. It also assists in time-consuming administrative tasks which would otherwise be costly to manage.

## References

Watts, S. & Muhammad, R. 2019, *SaaS vs PaaS vs IaaS: What’s The Difference & How To Choose*, viewed 29 March 2021<<https://www.bmc.com/blogs/saas-vs-paas-vs-iaas-whats-the-difference-and-how-to-choose/>>

Trend Micro Cloud One n.d., *AWS IAM Best Practices*, viewed 31 March 2021, <<https://www.cloudconformity.com/knowledge-base/aws/IAM/>>

Bishai, A. 2018, *How to optimize cost savings in AWS Marketplace*, viewed 7 April 2021, <<https://aws.amazon.com/blogs/awsmarketplace/how-to-optimize-cost-savings-in-aws-marketplace/> >

Amazon Web Services n.d., *Airbnb Case Study*, viewed 4 April 2021, <<https://aws.amazon.com/solutions/case-studies/airbnb-case-study/>>

Amazon Web Services 2014, *Gibraltar Area Schools Case Study*, viewed 4 April 2021, <[https://aws.*amazon*.com/solutions/case-studies/gibraltar-area-schools/?did=cr\_card&trk=cr\_card](https://aws.amazon.com/solutions/case-studies/gibraltar-area-schools/?did=cr_card&trk=cr_card)>

Violino, B. 2019, *What is PaaS? Platform-as-a-service explained*, viewed 4 April 2021 <<https://www.infoworld.com/article/3223434/what-is-paas-software-development-in-the-cloud.html>>

Bhattacharya, J 2021, *Is Netflix a SaaS? 25 Examples of SaaS Companies that Are Rocking*, Single Grain, viewed 10 April 2021, <<https://www.singlegrain.com/saas/examples-of-saas-companies/>>

Nemer, J. 2019, *AWS Regions and Availability Zones: The Simplest Explanation You Will Ever Find Around*, Cloud Academy, viewed 10 April 2021, <<https://cloudacademy.com/blog/aws-regions-and-availability-zones-the-simplest-explanation-you-will-ever-find-around/>>

Cloud Security Alliance 2020, *Shared Responsibility Model Explained*, viewed 10 April 2021, <<https://cloudsecurityalliance.org/blog/2020/08/26/shared-responsibility-model-explained/>>

Payscale n.d., *Average Systems Administrator Salary in Australia*, Payscale, viewed 12 April 2021, <<https://www.payscale.com/research/AU/Job=Systems_Administrator/Salary>>