RMIT International University Vietnam
Assignment 1 (Case study)

Subject Code:	**COSC2766**
Subject Name:	**Cloud Foundations**
Location & Campus	**SGS Campus**
Student name:	**Nguyen Quoc An**
Student Number:	**s3938278**
Lecturer's name:	**Dr. Nguyen Minh Long**

"I declare that in submitting all work for this assessment I have read, understood and agreed to the content and expectations of the Assessment Declaration."

A. Task A

Depending on the current needs, technology adaptability, and future plans of the Community Centre and the Theater Chain, they are both available for adopting and utilizing the infrastructure of AWS's cloud services. Despite that, the Theater Chain is shown to be more applicable due to the following reasons.

The Community Centre wants to manage its business assets, events, and activities through a website for a local community only, so the needs of the servers spanning over a large geographic space are redundant, while the Theater Chain has over 100 cinemas span all the country, so utilizing different AWS regions to have the closest server will greatly decrease the latency for their users (AWS Training & Certification n.d).

Although the requirements of the Community Centre are quite complex in comparison to the Theater Chain. It consists of a website, an email server, booking services, and a content management system, which is all available by making use of Amazon S3 for storing the content of the website with EC2 and RDS to operate the whole website and booking system. However, due to the low, locally focused traffic and the fact that they accept the infrequent downtime during the off-hours, thus investing in a local on-premise system will be more sustainable for them. Not to mention, it will be straightforward for the local IT company to fulfill their requirements without hiring new cloud engineers.

The Theater Chain, on the other hand, will benefit far more from integrating its business to the Amazon cloud, since it has over 100 cinemas nationwide that are facing consistent high-volume traffic patterns with unanticipated spikes and all have to be completely fault tolerant. All of this accelerates the complexity of setting up and managing the IT infrastructure.

By migrating to the cloud, Theater Chain can avoid the initial cost of purchasing and building hardware, maintaining and configuring software, and converting those into variable costs due to the pay-as-you-go principle of AWS(AWS Training & Certification n.d). With EC2 auto-scaling, the computing resources can automatically adjust to handle the spike in traffic and terminate the instances when the demand is off to save cost and ensure no downtime issues for the system (Amazon Web Services n.d). Furthermore, AWS Elemental Media Convert (EMC) and Elemental Media Package (EMP) will enable the Theater Chain to execute their future plans of broadcasting new movies to many users with different types of devices (CloudHesive n.d).

The Theater Chain will have adequate support and assistance to manage and upgrade its cloud system without having to train or hire new cloud employees because they have a long-term contract with an IT business specializing in cloud-based solutions. This also guarantees that the Theater Chain now can stop worrying about its technical side, and focus more on its business, customer experience, and connections.

In conclusion, while both the Community Centre and the Theater Chain can benefit from adopting AWS's cloud infrastructure, the Theater Chain has proven to be the more suitable candidate given its size, requirements, and future plans to expand its offerings.

B. Task B

Every category of Cloud computing has its own limitations, so to decide what is the most suitable solution for the Theatre Chain, we need to assess the opportunities and obstacles that each type of cloud computing have with the current scale of the business. Presently, according to Statista, there are 2290 cinema screens in Australia (Statista 2021), so with more than 100 theatres, the Theatre Chain is the 6th largest cinema chain that makes up 4.3% of the market shares (Appendix A), in which they have to serve up to 772614 customers (Appendix B).

Due to a large pool of customers, using a SaaS solution from either a third-party company or Amazon will raise the cost substantially, for example, a subscription to Setmore Pro booking service SaaS is $5 per user per month (Setmore 2023), not to mention that data of the customer will be stored in a third-party data center, which will raise data security concerns. PaaS solution on the other hand still has an issue with system compatibility when

the Theatre Chain wants to have more controls and options for future expansions, take AWS RDS as an example, it only provides 6 options for databases with limited customization (Amazon Web Services, Inc. 2023). This makes IaaS become the most applicable solution, since the limitation of the responsibility to set up, build and deploy the initial infrastructure can be eliminated by the long-term contract with an IT company specialized in Cloud Computing that can take care of those processes and maintenance, so Theatre Chain does not have to hire a new IT team and focus on their business.

With more than 700,000 users to serve, IaaS is cheaper in the long run, due to the ability to scale up and down based on their needs, This is especially critical for the theater chain, which must manage huge amounts of traffic with unforeseen spikes in rush hour with a demand of no downtime, therefore, to optimize the cost efficiency, they can use AWS EC2 with auto-scaling enabled to examine and provision their compute resources automatically based on demand. This means when the traffic into the system increases, it can instantly scale up the resource to launch more EC2 instances to handle those incoming requests without delay or downtime, then spin the resources down when the demand is calmer (Amazon Web Services n.d). EC2 instances can also be configured to span across multiple Availability Zones, to compensate for unhealthy instances in case of hardware failure, power outage, or natural disaster (Amazon Web Services n.d). Together, this makes sure the booking system is capable of handling high volume and spiky traffic, with no timeout, and also enables them to optimize the cost of operation not to surpass their planned expenditure.

Additionally, IaaS gives the Theatre Chain opportunity to tailor and customize the system to meet their specific needs and requirements, this flexibility also opens the possibility for their future development or changes, making them not stuck to a single service provider. They can work with their IT company partner to launch their film streaming service, and easily integrate it into their existing system to utilize their database and resources since they have full control over their virtual infrastructure. Furthermore, they can develop and use their own ERP or CRM software, since investing and implementing ERP solutions into organizations have been proven to improve operational performance significantly (McAfee 2002, cited in Madapusi et al. 2012)

In conclusion, with the partnership with the IT company, IaaS is the most suited cloud implementation for the Theatre Chain. It will provide the cost-effectiveness, flexibility, and future scalability required for this business to easily manage its IT infrastructure, and focus on its business development.

C. Task C

The current infrastructure of the Theatre Chain consists of more than 100 cinemas nationwide in Australia, and their need is to have an IT infrastructure, including a website and booking service to properly managed their customer. It is required to handle high and unpredictable increase in users requests, and the company require the system no have full availability. Additionally, they also have plans for future expansion of releasing a online film-streaming service for their users. In this scenario, it is clearly essential for them to choose to spread their cloud infrastructure across the two nearest regions Sydney and Singapore, as it will open opportunities for growing their business to go global and expand their user base, as well as beneft them in various ways.

First of all, the crucial characteristic of an online booking service is for it to have perfect availability, which allows customers to make orders anytime and anywhere. This high availability and stability can be achieved by spanning the service across multiple AWS regions so in case of natural disasters, hardware or electrical failures that affect the whole AWS region, let's say AWS Sydney is interfering with a mass power outage, the system will be still available for customers to access via the service provided by AWS Singapore and will be reverted back when the problem is fixed. Furthermore, data can also be replicated to multiple Availability Zones in a single region to allow resistance to zone failures, increase system stability, and provide backup options in case of data loss. For the future online movie streaming service, users can be redirected to the appropriate cloud server based on their closest distance to that server, to have the fastest connection. Overall, this multi-region and zone architect ensures the highest possible availability in any case of failure for the system and the lowest latency for the users, especially for the film streaming service, where latency is a vital factor that affects the user experience.

Secondly, operating parallelly in two regions will assist the theatre chain booking system and website to handle increasing user traffic. This is done by multi-region load balancing using a combination of AWS Route 53 and AWS ELB, in which Route 53 geolocation routing based on DNS, will route the request from the user to suitable regions based on their location. The ELB will then take those incoming traffics and distribute them across a set of instances in that specific region. It can also scale up and provide additional instances depending on the amount of traffic. Additionally, health checks for instances are also performed before assigning requests to any instances, to ensure the efficiency of the system. This implementation achieves low latency and high availability even in the stage of high traffic during peak periods, for instance in holidays, or when a new movie is released, customers' orders will increase significantly.

Lastly, due to the cost difference between regions for different services, for example, at the time of writing, an EC2 instance t2.micro with 1 vcpu and 1GiB memory, with Compute Savings Plans, 3 years reservation and all upfront payment plan, from Singapore ($170.82) is, cheaper than Sydney ($194.47) by 12.1% (Appendix C). By analyzing the user's demand and behavior, for example, what movie is being seen the most, and what time of the day the user access the website, the Theatre Chain can manage and allocate the storage resources and compute power accordingly for a region to optimize the cost.

D. Task D

The creation and maintenance of the booking system and website will be handled by the partner IT company, so there are several securities that they can apply to protect the system and data integrity internally and externally.

Firstly, to ensure internal security within the company, during the initial creation of the Theater Chain's root account, the IT team should use AWS IAM to create an IAM user with admin permissions and use that right away to perform further actions, since using the root account can cost a large impact on the case of mistakes, so it should only be used for billing or payment, etc. Enable password policy and turn on MFA for all users to add multiple-layer security in case some developer gets their username and password got compromised. Store the credentials of the root account somewhere safe and use the admin IAM account to create IAM groups, for the Theater Chain, different groups for different divisions can be made, for instance: Developers, Admins, or Testers then assign the appropriate personnel in charge to the corresponding group, and do not attach IAM policies directly to the user. Furthermore using SCPs to divide the employee group into different units like IT, Finance, HR, etc. This procedure makes the system obey the principle of least privilege in which users are only granted the minimal access needed (Amazon Web Services, Inc.).

Tracking and logging users' access to the system is also a crucial security aspect. AWS CloudTrail will be the optimal solution for audit and managing the activities of users by providing detailed logs of all API calls to the system, helping the IT company to detect any suspicious requests or issues, therefore fixing it in the meantime to increase the experience for the customers. Additionally, utilizing AWS Cost and Usage Report also identifies malfunctioning tasks, for example, a developer takes advantage of some EC2 instances to mine Crypto Currency.

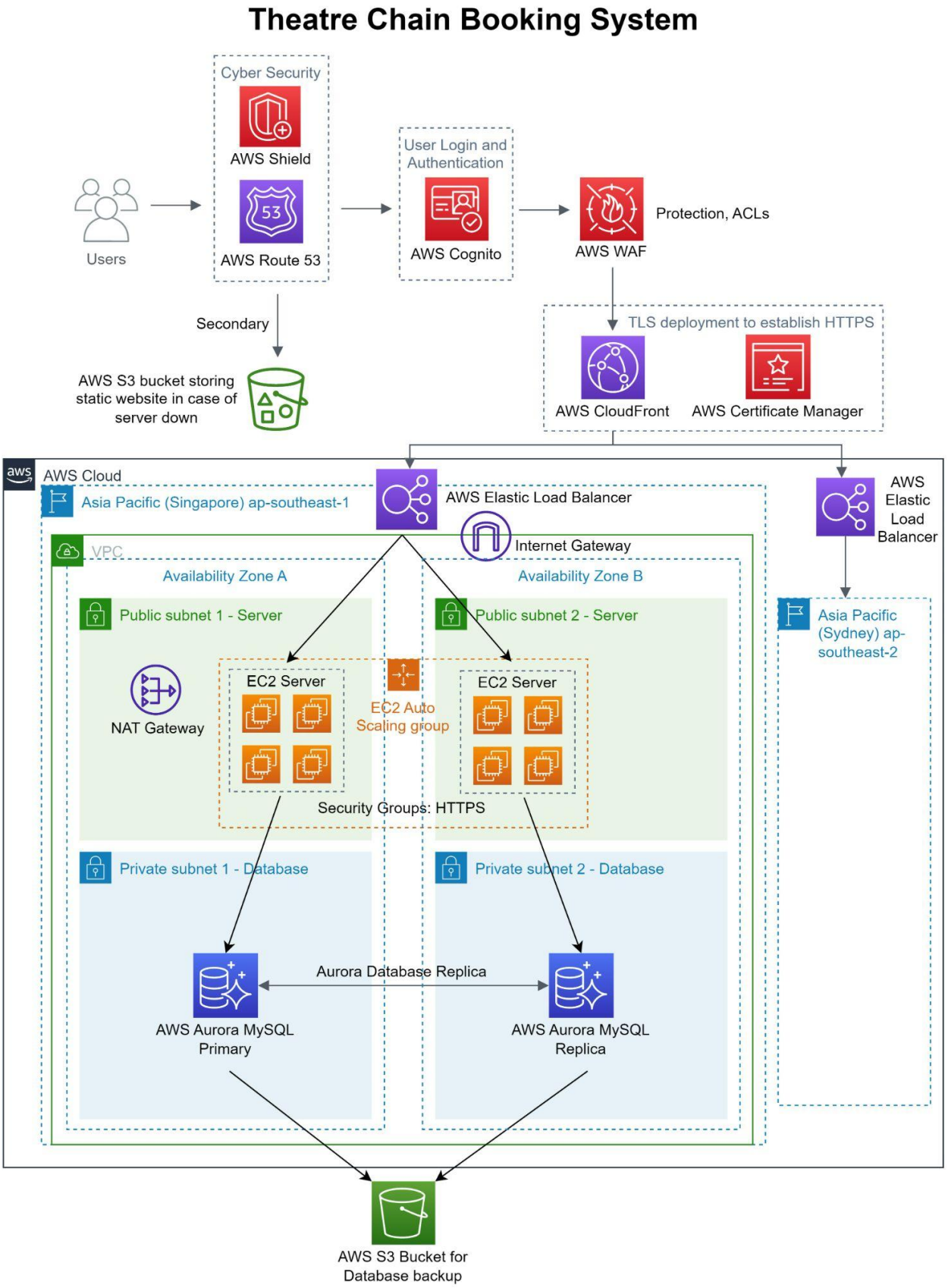
Moving on to security from external factors, the Theatre Chain (IT company) is responsible for securing their data at rest and in transit. They can use AWS KMS to produce and manage their secret encryption keys - CMKs, instead of managing those keys by themselves which will cost them more time. Those keys can be used to encrypt their plain data at rest for S3 and RDS, which is used to store their user's personal information and payment credentials. Only the users who have access to the key can decrypt the data, so if the data is leaked or hacked, the hacker still cannot steal the user's important credentials, which is crucial for the booking system.

For data in transit across the system, from and to users, or over Singapore and Sydney regions. AWS Certificate Manager is capable of managing and deploying SSL or TLS 1.2 certificates, which are used to establish an official identity for the booking website, set up HTTPS channel and asymmetric encryption techniques to secure the

communication and data transfer pipeline between the user payment gateway to the EC2 instance and then store the transaction in RDS database of Theatre cloud system.

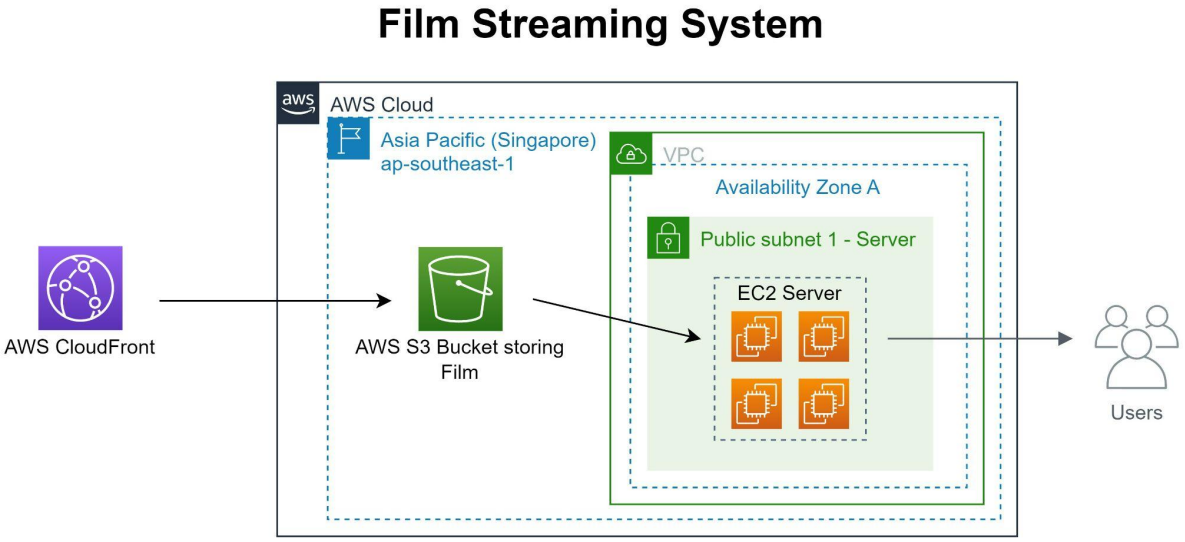
Lastly, to build a user-login system with an authentication service for their booking website, they can utilize AWS Cognito to have a solution that is compatible with other identity providers using SAML 2.0 protocol like Facebook or Google account. This saves them time and human resources to build the system from scratch and ensure the system meets the compliance requirements for Payment - PCI DSS (Amazon Web Services, Inc. 2023). Additionally, enable AWS Shield Standard to protect the website from cyber attacks like DDOS with no additional cost (Amazon Web Services, Inc. 2023).

E. Task E



The AWS service architecture for the Theatre Chain booking system is shown above. After accessing the website, the user will be routed by AWS Route 53, to a static error website stored in an S3 bucket, in case all the servers are down, otherwise, they are routed to a sign-in page for authentication. With the use of AWS Cognito, users can be authenticated using any identity provider using SAML 2.0 like a Google account, and all of those requests will be protected by AWS WAF firewall and ACLs are used to ban blocked users, and bots, it also adds an extra layer of cyber security for the system. Based on the user's location, they will be directed to the nearest edge locations in either Singapore or Sydney Region with the lowest latency, to deliver the booking service website content. The use of AWS CloudFront also is a future opportunity to open up an online film streaming service, which will utilize CloudFront caching to achieve high performance, real-time content delivery network. AWS Certificate Manager will issue TLS/SSL certificates to validate the identity of the website and establish a secure HTTPS connection between the users and server, to comply with the local laws and regulations to secure the user's payment.

The system architecture of both Singapore and Sydney regions is identical, the Elastic Load Balancer will divide and balance the incoming traffic into two different Availability Zones, to increase availability and avoid overloading. The zone will be further divided into public and private subnets to achieve high-security measures. The server is powered by EC2 instances spanning across 2 Availability Zones and placed into an auto-scaling group to handle the unexpected spike in traffic and scale down in calmer periods to optimize cost. The user request will be handled by these instances, user's data and payment will be saved into the according mySQL Aurora database in the private subnet, and replicated to the parallel database automatically, Aurora database is chosen due to its ability to auto-replicate to other zones. In the end, all of those data will be saved into an S3 bucket for backup every week.



For the future release of the film streaming service, when a user initiates a request for a film, the EC2 web server will retrieve the movie store in an S3 bucket in the appropriate region, and edge location nearest to the user and stream it to them. This structure can be implemented directly in the current architecture of the current booking service, to save initial set-up costs, and increase scalability.

F. Task F

Assumption:

- The system total traffic = 700,000 customers
- Daily traffic: 5% of total traffic = 35,000 concurrent users
- Peak traffic: 10% of total traffic = 70,000 concurrent users
- Request: 10 requests per session.

Database:

- Customer information = 500KB(per user) x 700,000(user) = 350 GB
- Movie information = 200KB(per movie) x 1000(movie) = 200 MB
- Log information = 1KB(per log) x 10000(per day) x 30(day) = 300 MB/month

Storage:

- Movie total file size = 4GB (per HD movie) x 2000 = 8 TB
- Request volume = 10000 (request per hour) x 24(hour) x 30(day) = 7200000 request/month

Content Delivery Network

- Object size = 100KB
- Request volume = 4000000 (request per day) x 30 (day)= 120000000 (request per month)
- Data out to origin = 120000000KB x 100 = 12TB

Service	Data Required	Estimated Monthly cost (Sydney) (Appendix D)	Estimated Monthly cost (Singapore) (Appendix E)
Amazon Elastic Compute Cloud (EC2)	• 4-14 shared m5.2xlarge instances with 8 vCPUs, 32GiB Memory, Up to 10 Gigabit Network Performance, 1 GB EBS gp3 storage, Linux OS, Daily spike traffic of 3hours/days for 7 days • On-demand payment	1,840.10 USD	1,840.10 USD
Amazon Aurora MySQL-Compatible	• 2 db.r5.xlarge instances with 4 vCPUs, 32 GiB Memory, Up to 10 Gigabit Network Performance, 100% Utilized/month, RDS Proxy • 500GB Storage, Baseline IO rate: 10/minute, Peak IO rate 20/minute, Duration of peak IO: 90 hours/month. 100GB Backup Storage • On-demand pricing	1,184.53 USD	1,184.53 USD
Amazon Simple Storage Service (S3)	• 8TB S3 Standard storage per month • 3600000 PUT, COPY, POST, LIST requests • 7200000 GET, SELECT, and all other requests • 3TB/month data returned by S3 Select • 7TB/month data scanned by S3 Select	246.35 USD	246.36 USD
Amazon Route 53	• 2 Hosted Zones with no traffic flow • 1 billion standard queries per month	401.00 USD	401.00 USD
Amazon Elastic Load Balancing	• 2 Application Load Balancers • Processed bytes (EC2 Instances and IP addresses as targets): 100 GB per hour • Average number of new connections per ALB: 100 per second • Average connection duration: 60 seconds • Average number of requests/second/ALB: 10 • Average number of rule evaluations/request: 10	1,204.79 USD	1,204.79 USD
AWS Shield	• 1TB per month Cloud Front usage	3,025.60 USD	3,025.60 USD
Amazon Cognito	• 100000 Monthly active user • Advanced security features enabled • 10% monthly users who sign in through SAML or OIDC federation	4,674.25 USD	3,025.60 USD
AWS Web Application Firewall (WAF)	• 2 Web ACLs utilized per month • 1000 Rules added per Web ACL per month	2,010.00 USD	2,010.00 USD
AWS CloudFront	• Data transfer out to internet: 12 TB/month • Number of requests: 12000000/month	1,448.00 USD	1,448.00 USD
IT Company		20,000.00 USD	
Total		52069.24 USD/Month	

Reference:

AWS Training & Certification (n.d) *AWS global infrastructure*, AWS Skill Builder website, accessed 26 March 2023. https://explore.skillbuilder.aws/learn/course/134/play/62437/aws-cloud-practitioner-essentials

AWS Training & Certification (n.d) *Cloud computing*, AWS Skill Builder website, accessed 27 March 2023. https://explore.skillbuilder.aws/learn/course/134/play/62437/aws-cloud-practitioner-essentials

Amazon Web Services (n.d), *Amazon EC2 Auto Scaling benefits*, Amazon Elastic Compute Cloud Documentation website, accessed 27 March 2023. https://docs.aws.amazon.com/autoscaling/ec2/userguide/auto-scaling-benefits.html

CloudHesive (n.d) *Learn About the Full Suite of Video Transport, Processing, and Delivery Tools Provided in AWS Elemental*, CloudHesive website, accessed 27 March 2023. https://www.cloudhesive.com/blog-posts/breakdown-aws-elemental-mediaconnect-mediaconvert-medialive-mediapackage-mediastore-mediatailor/

Statista (2021) *Number of cinema screens in Australia in 2021*, by exhibitor, Statista website, accessed 9 April 2023. https://www.statista.com/statistics/980277/number-cinema-screens-by-exhibitor-australia/

Statista (2022) *Cinema attendance in Australia from 2013 to 2021*, Statista website, accessed 9 April 2023. https://www.statista.com/statistics/938478/cinema-attendance-australia/

Australian Bureau of Statistics (2023) *Population clock*, Australian Bureau of Statistics website, accessed 9 April 2023. https://www.abs.gov.au/AUSSTATS/abs%40.nsf/Web%2BPages/Population%2BClock?opendocument=&ref=HPKI

Amazon Web Services (2023) Amazon RDS FAQs, *Amazon Web Services*, Inc. website, accessed 9 April 2023. https://aws.amazon.com/rds/faqs/

Setmore (2023) *Setmore Pricing*, Setmore website, accessed 9 April 2023. https://www.setmore.com/pricing

Madapusi A and D'Souza D (2012) 'The influence of ERP system implementation on the operational performance of an organization', *International Journal of Information Management*, 32(1):24-34, doi:10.1016/j.ijinfomgt.2011.06.004.

Amazon Web Services (2023) *AWS Shield Features*, Amazon Web Services, Inc. website, accessed 12 April 2023. https://aws.amazon.com/shield/features/

Amazon Web Services (2023) *Amazon Cognito Features*, Amazon Web Services, Inc. website, accessed 12 April 2023. https://aws.amazon.com/cognito/details/

Amazon Web Services (2023) *Security best practices in IAM*, Amazon Web Services, Inc. website, accessed 12 April 2023. https://docs.aws.amazon.com/IAM/latest/UserGuide/best-practices.html

Appendix:

Appendix A:
Market Share = (Total cinema screens of the company/ Total cinema screens of the industry)*100%

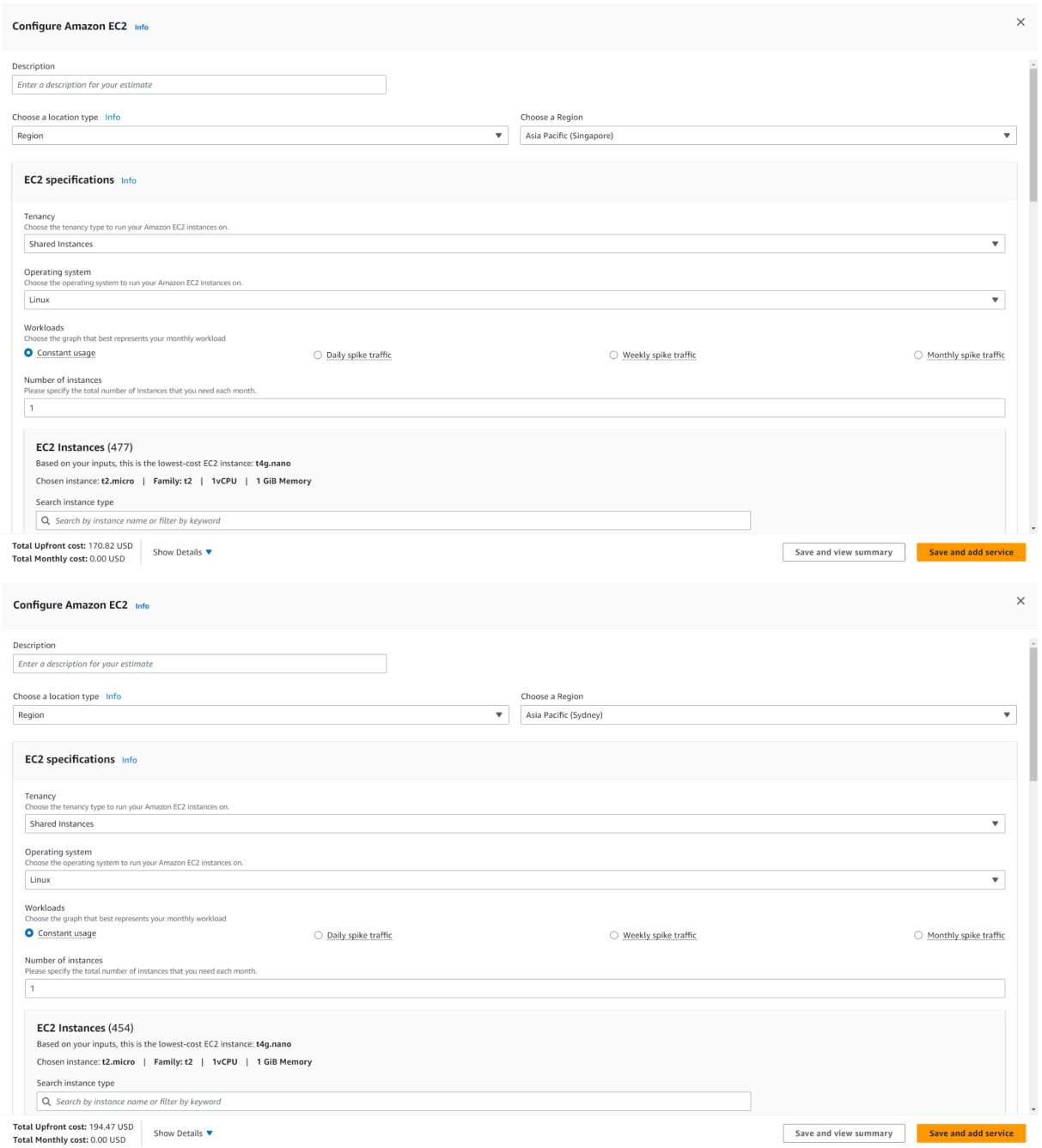
Market Share = (100/2290)*100 = 4.3%

Appendix B:

Population of cinema attendants = average cinema attendance rate * population of Australia = 68% (Statista 2022) * 26,423,197 (Australian Bureau of Statistics 2023) = 17967774 people

Population of customer = Company's market share * (population of cinema attendants) = 4.3% * 17967774 = 772614 people

Appendix C:



Appendix D:

Contact your AWS representative:
https://aws.amazon.com/contact-us/

Export date: **4/16/2023** Language: **English**

Estimate title: **My Estimate**

Estimate URL: **https://calculator.aws/#/estimate?id=c3e1d9ede0853d3fd408d533977ad052ac8cd3e0**

Estimate summary

Upfront cost	Monthly cost	Total 12 months cost
0.00 USD	**16,034.62 USD**	**192,415.44 USD** Includes upfront cost

Detailed Estimate

Name	Group	Region	Upfront cost	Monthly cost
Amazon EC2	No group applied	Asia Pacific (Sydney)	0.00 USD	1,840.10 USD
Description: **Config summary:** Tenancy (Shared Instances), Operating system (Linux), Workload (Daily, (Workload days: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Baseline: 4, Peak: 14, Duration of peak: 3 Hr 00 Min)), Advance EC2 instance (m5.2xlarge), Pricing strategy (On-Demand), Enable monitoring (disabled), EBS Storage amount (1 GB), DT Inbound: Not selected (0 TB per month), DT Outbound: Not selected (0 TB per month), DT Intra-Region: (0 TB per month)				
Amazon Aurora MySQL-Compatible	No group applied	Asia Pacific (Sydney)	0.00 USD	1,184.53 USD
Description: **Config summary:** Change records per statement (0.38), Instance Type (db.r5.xlarge), Nodes (2), Utilization (100 %Utilized/Month), Instance Family (Memory optimized), Pricing Model (OnDemand), Storage amount (500 GB), Additional backup storage (100 GB)				
Amazon Simple Storage Service (S3)	No group applied	Asia Pacific (Sydney)	0.00 USD	246.35 USD
Description: **Config summary:** S3 Standard storage (8 TB per month)				

Amazon Route 53	No group applied	Asia Pacific (Sydney)	0.00 USD	401.00 USD
Description: **Config summary:** Hosted Zones (2)				
Elastic Load Balancing	No group applied	Asia Pacific (Sydney)	0.00 USD	1,204.79 USD
Description: **Config summary:** Number of Application Load Balancers (2)				
AWS Shield	No group applied	Asia Pacific (Sydney)	0.00 USD	3,025.60 USD
Description: **Config summary:** Cloud Front Usage (1 TB per month)				
Amazon Cognito	No group applied	Asia Pacific (Sydney)	0.00 USD	4,674.25 USD
Description: **Config summary:** Number of monthly active users (MAU) (100000), Advanced security features (Enabled)				
AWS Web Application Firewall (WAF)	No group applied	Asia Pacific (Sydney)	0.00 USD	2,010.00 USD
Description: **Config summary:** Number of Web Access Control Lists (Web ACLs) utilized (2 per month), Number of Rules added per Web ACL (1000 per month)				
Amazon CloudFront	No group applied	Asia Pacific (Sydney)	0.00 USD	1,448.00 USD
Description: **Config summary:** Number of requests (HTTPS) (12000000 per month), Data transfer out to internet (12 TB per month)				

Acknowledgement

AWS Pricing Calculator provides only an estimate of your AWS fees and doesn't include any taxes that might apply. Your actual fees depend on a variety of factors, including your actual usage of AWS services. Learn more

Appendix E:

Contact your AWS representative:
https://aws.amazon.com/contact-us/

Export date: **4/16/2023** Language: **English**

Estimate title: **My Estimate**

Estimate URL: **https://calculator.aws/#/estimate?id=21125ceca96a0d9a318f311d3d187cf028a19d29**

Estimate summary

Upfront cost	Monthly cost	Total 12 months cost
0.00 USD	**16,034.63 USD**	**192,415.56 USD** Includes upfront cost

Detailed Estimate

Name	Group	Region	Upfront cost	Monthly cost
Amazon EC2	No group applied	Asia Pacific (Singapore)	0.00 USD	1,840.10 USD
Description: **Config summary:** Tenancy (Shared Instances), Operating system (Linux), Workload (Daily, (Workload days: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Baseline: 4, Peak: 14, Duration of peak: 3 Hr 00 Min)), Advance EC2 instance (m5.2xlarge), Pricing strategy (On-Demand), Enable monitoring (disabled), EBS Storage amount (1 GB), DT Inbound: Not selected (0 TB per month), DT Outbound: Not selected (0 TB per month), DT Intra-Region: (0 TB per month)				
Amazon Aurora MySQL-Compatible	No group applied	Asia Pacific (Singapore)	0.00 USD	1,184.53 USD
Description: **Config summary:** Change records per statement (0.38), Instance Type (db.r5.xlarge), Nodes (2), Utilization (100 %Utilized/Month), Instance Family (Memory optimized), Pricing Model (OnDemand), Storage amount (500 GB), Additional backup storage (100 GB)				
Amazon Simple Storage Service (S3)	No group applied	Asia Pacific (Singapore)	0.00 USD	246.36 USD
Description: **Config summary:** S3 Standard storage (8 TB per month)				

Amazon Route 53	No group applied	Asia Pacific (Singapore)	0.00 USD	401.00 USD
Description: **Config summary:** Hosted Zones (2)				
Elastic Load Balancing	No group applied	Asia Pacific (Singapore)	0.00 USD	1,204.79 USD
Description: **Config summary:** Number of Application Load Balancers (2)				
AWS Shield	No group applied	Asia Pacific (Singapore)	0.00 USD	3,025.60 USD
Description: **Config summary:** Cloud Front Usage (1 TB per month)				
Amazon Cognito	No group applied	Asia Pacific (Singapore)	0.00 USD	4,674.25 USD
Description: **Config summary:** Number of monthly active users (MAU) (100000), Advanced security features (Enabled)				
AWS Web Application Firewall (WAF)	No group applied	Asia Pacific (Singapore)	0.00 USD	2,010.00 USD
Description: **Config summary:** Number of Web Access Control Lists (Web ACLs) utilized (2 per month), Number of Rules added per Web ACL (1000 per month)				
Amazon CloudFront	No group applied	Asia Pacific (Singapore)	0.00 USD	1,448.00 USD
Description: **Config summary:** Number of requests (HTTPS) (12000000 per month), Data transfer out to internet (12 TB per month)				

Acknowledgement

AWS Pricing Calculator provides only an estimate of your AWS fees and doesn't include any taxes that might apply. Your actual fees depend on a variety of factors, including your actual usage of AWS services. Learn more