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AWS Essay Questions

1. Discuss the evolution of AWS from its initial purpose to its current position in the cloud computing market.

Amazon Web Services (AWS) had first launched in 2006 as a solution to Amazon’s internal infrastructure challenges. He services offered were Amazon S3 for storage and EC2 for computation to all for scalable resources for its users. AWS quickly evolved into a full fledged cloud platform which allowed for people to access enterprise grade resources, effectively democratizing technology. With this accomplished it became significantly easier for startups of any type to get their operations moving. With the payments based on utilization, as well as not needing to manage servers being a massive plus to the business model. AWS has since expanded its model to include over 200 hundred services, ranging from machine learning and IoT to serverless computing and blockchain. Today AWS is the dominant cloud service provider in the market, powering millions of applications across industries. AWS’s global infrastructure, innovation pace, and customer-centric approach has made it a cornerstone of digital transformation worldwide.

1. Analyze the benefits and drawbacks of the "pay-as-you-go" pricing model for businesses using AWS services.

For AWS the pay-as-you-go price model is what made the cloud service so popular. It has set the standard for the industry. By allowing customers to have business flexibility and cost control cloud computing has become highly economical for the typical company. Pay as you go allows you to scale up resources as needed to keep services running for customers. These scalable resources include computational power, storage, and bandwidth. For a startup this makes for the perfect solution in the following ways. The owner will not have to host their own servers which can easily lead to paying more than what is needed for service. Additionally organizational data is significantly safer compared to the typical low security of a startup. On peak hours such as black Friday the services can automatically increase for computational power, bandwidth, and storage to ensure customers can always reach your services. However if a business is not ensuring these services are optimized for cost efficiency you may face bill shock from underestimated usage. Also for an organization that would have a consistently high resource usage pay as you go would not be the effective option.

1. Compare and contrast AWS compute services such as EC2, Lambda, and Elastic Beanstalk, highlighting their strengths and ideal use cases.

AWS offers a multitude of ways to utilize AWS compute power. The current services offered are EC2 which allows for full control of your virtual machines for persistent tasks. Lambda which is a serverless feature for event-driven code execution for short-lived tasks at 15 minutes and under. ECS/EKS lets you containerize microservices and applications. Faregate will let you run containers without the need for managing EC2 instances. Lastly Elastic Beanstalk gives you the ability to have automated scaling and management.

Focusing on the three in question starting with the ladder, EC2 gives users the ability to scale CPU, memory, and storage, as well as full access to OS and Network settings. This solution would be ideal for applications that will be running constantly, as well as software that is considered legacy. An example service would be a web app for a financial company that has predictable usage, and a need for strict security requirements. By choosing EC@ the financial organization will be responsible for the security patches, network configs, and resource allocation.

Next would be Lambda which is a serverless compute service that allows for event driven code execution with a 15 minute cap on the life of the code. This service does not require infrastructure management, provides auto-scaling as needed, and payments are based off of execution time. A typical example of a need for this could be for image optimization for a web server without the need for a dedicated server to handle this.

Lastly Elastic Beanstalk is in the middle of both Lambda and EC2 as it does not require the level of maintenance of EC2 but still has more functionality than lambda. This service is ideal for running web applications as it will handle load balancing, scaling, and monitoring to ensure proper optimization at all times. Elastic Beanstalk will still allow for customization for making it an ideal service for developers. It supports multiple languages and works well with DevOps with a minimal amount for DevOps experience.

1. Explain how AWS storage services contribute to data security, cost optimization, and enhanced agility for businesses.

AWS offers three different storage solutions, being S3, EBS, and EFS. Each solution has different levels of security value, cost, and agility.

**S3**

Starting with S3 this service is ideal for a long term archival of data that allows for object lock to meet regulatory retention requirements, and compliance heavy environments. S3 has the best in market data durability with and 11 nine rating. S3 allows for Access Control, Audit Logging, client-side encryption utilizing HTTPS/TLS, and server side encryption with 256 bit advanced encryption standard.

Given the above information on S3 it would make for the ideal cost optimization for a user that needs long term archival of data with infrequent access. Additionally, S3 allows for tiered storage classes depending on your need to access your data. There are options for frequently accessed data, as well as a middle ground that allows for intelligent archiving of data based on access patterns.

S3 allows for serverless workflows and global syncing of data. Data can be accessed anywhere via HTTPS allowing for setups like distributed audit systems. Capable of Lambda functions for event driven code execution. Data can be easily be mirrored to different locations for disaster recovery situations.

**EBS**

EBS allows for persistent encrypted volumes that would be ideal for databases and financial apps. Thus, allowing data security at all times both at rest and in transit. Data is automatically encrypted at the host level when in transit, while is at rest and in transit AES-256 encryption is in use creating a highly secure environment for data security. Access control allows for restriction of what or who can access your data.

Allows for optimization of storage needs to provide performance needs at a lower cost. Volumes can be resized easily without downtime to prevent overprovisioning of resources which can easily drive up costs. Additionally EBS allows for incremental backups which reduce storage costs as you only pay for the data that has changed since the last backup.

Provides the ability for agile dev/ test cycles as well as lets you replicate environments quickly. Great for scaling compute environments due to capability adjust volume size as well as the ease of detaching and reattaching volumes instantly.

**EFS**

EFS utilizes AES-256 encryption for data at rest, and HTTP/TLS for data in transit giving EFS a high security rating for your data. Data is safe guarded by file system policies ensuring data cannot be modified or deleted. The data can be further secured by the use of access point which allows for a restriction of what can access your data.

Allows for either active workloads of infrequent access (IA) options. After certain amount of time file untouched will automatically be moved to IA. You only pay for what is stored and access not based off of predetermined data storage limit. This is great for a shared environment with unpredictable access patterns.

Allows for multiple read/write instances to operate simultaneously. Cost optimization due since storage is provisioned as needed., and seamless integrations with ECS, EKS, and Lambda. Build to be flexible to allow for multi-user environments which is perfect for collaborative data environments

1. Discuss the role of AWS networking services in ensuring application scalability, reliability, and security.

**Scalability**

AWS allows for dynamic growth based on the needs of an organization and ensures a safe optimized environment with the below tools.

AWS utilizes Elastic Load Balancing (ELB) which does load balances applications, network, and gateways to ensure your data is always optimized for accessibility.

Amazon Route S3 ensures users are always accessing their nearest endpoint. Thus improving latency and availability.

Auto Scaling + VTC Integration will automatically adjust your compute resources as needed, whilst VPC ensures an isolated and secure environment.

AWS Transit Gateway acts as a central hub for connecting multiple Virtoul Private Cloud, as well as on-prem networks to allow for hybrid multi region architectures.

**Security**

AWS implements security at every layer of it networking.

Amazon VPC allows resources to be logically isolated to ensure is data is accessible but accessible. This allows for control of IP ranges subnets, routes, and gateways for who can access resources.

Security Groups and Network Access Control Lists (ACS) controls inbound and outbound traffic.

AWS Shield and AWS Web Application Firewall (WAF) will protect your environment form DDOS attacks and web exploits. Shield will offer real time mitigation to threats.

PrivateLink and VON will provide for secure access to AWS services without exposing traffic to the public.

Identity Access Management (IAM) and resource policies ensures finely tuned access control for users which is critical for multi user environments.

**Reliability**

AWS allows for disaster recovery hot sites to ensure consistent usage. Dedicated private network links to your data mans well as audit trails to allow for monitoring and visibility into your metrics.

With good scalability, accessibility, isolated environments, and a resilient architecture, AWS is easily a top dog in the market.