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Advi DevOps Assignment - I

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Roll No. 48

Class - DISC

Assignment - I

Q.1] Use S3 bucket and host video streaming

Ans. To use Amazon S3 bucket for video streaming, we need to use S3 buckets as a container and CloudFront as a Content Delivery Network (CDN).

Step 1: Set Up Amazon S3 bucket.

1] Go to S3 Bucket Creation Option and click on Create Bucket Name the Bucket. Block all public access to restrict unauthorized people do not use the video.

2] Keep the other options as default.

3] Then click on bucket name and then add your video with .mp4 extension using the upload button.

4] Select the file to be uploaded using the Add File. Select the video and Add. Then scroll down and click on Upload.

Step 2: Set up Cloudfront as CDN.

1] While video is being uploaded, search for Cloudfront on services tab and open it in a new tab.

2] On the left pane, under security, you will find origin access. Click on it, then click on Identities (legacy). Click on Create origin access identity.

3] Click on Create. Give the name and click on Create. Now, go back to Distributions on the left pane and click on Create a Cloudfront Distribution.

- 4) Give the identity a name and click on Create. Now, go back to Distributions on the left pane and click on Create a CloudFront distribution.
- 5) Click on Create Distribution
 - a] In origin field, select the S3 bucket where video is uploaded.
 - b] Under origin access, select Legacy access identities.
 - c] Under origin access identities, select the identity that you have created.
 - d] Under bucket policy, select Yes, update bucket policy.
 - e] In Default Cache behaviour, under viewer, select Redirect HTTP to HTTPS making the hosting secure.
 - f] Under the Web Application Firewall, select enable security protections to provide a layer of security.
 - g] Keep remaining options as default and click on Create Distribution.

~~Step 3 : Accessing the Hosted Video~~

- 1) Copy the domain name from deployed distribution.
- 2) a) Go to S3 bucket, click on bucket name.
 - b) Click on video. Then, copy the key.
 - c) Run the hosted video using domain name and key.
- 3) <domain-name_of_distribution>/<key_of_video>

Q.2) Discuss a BMW and Hot star case studies using AWS.

Ans) BMW

BMW uses Amazon Web Services (AWS) to build and scale its connected car platform, providing services like real-time traffic updates, remote locking, and vehicle diagnostics. AWS supports BMW's long-term goals for electric and autonomous vehicles by driving data-driven innovation.

Key Points:

1) Scalability:

BMW uses Amazon Elastic Kubernetes Service (EKS) to manage and scale its microservice-based architecture, which powers the connected car platform. This setup efficiently supports over 20 million connected vehicles, handling billions of daily data requests.

2) Data analytics

BMW leverages AWS's data services, such as Amazon S3 for storage, Amazon EMR for big data processing, and Amazon Athena for querying, to analyze enormous big amounts of vehicle and user data. This helps BMW derive actionable insights, enhancing vehicle services like predictive maintenance and performing monitoring.

3) Security

Security is paramount in BMW's architecture, especially when dealing with sensitive vehicle and user data. AWS Identity and Access Management (IAM) and AWS Key Management Service (KMS) are employed to securely manage access controls and encryption.

4) Supply Chain Transparency (PastChain Platform)

To improve traceability and transparency in its supply chain, BMW has built the PastChain Platform on Amazon EKS and blockchain technology.

e) Cost Optimization

BMW uses Amazon EC2 Auto Scaling to adjust compute capacity based on real-time demand, preventing over-provisioning and reduced operational costs. By dynamically scaling resources up or down, BMW optimizes costs while maintaining service reliability across regions.

f) Employee Upskilling and Innovation

AWS plays a pivotal role in training BMW's workforce. BMW aims to upskill 5000 engineers and certify 2,000 employees in cloud services like machine learning and data analytics. This upskilling initiative enhances internal innovation, allowing BMW to maintain its competitive edge in the fast-evolving automotive industry.

g) Cloud Data Hub

The BMW Cloud Data Hub, powered by AWS, serves as a central platform for collecting, processing and analyzing vehicle data.

Through AWS, BMW accelerates the development of electric and autonomous vehicles and enhances digital-to-customer services, aligning with its long-term strategy for a connected, efficient, and sustainable automotive system.

Hotstar:

Disney + Hotstar is a popular Indian subscription streaming service owned by Star India, a subsidiary of Walt Disney Company India. It easily and effectively connects the EC2 instances or Amazon S3 buckets, and it also provides the routing information to the outside of the AWS infrastructure.

Services for Hotstar AWS used are explained below:

1) Amazon EC2

Provide scalability and reusability to the computability capacity in the AWS cloud, which makes less to hardware and more to the developing and deploying applications to the cloud. Which is more helpful to the application developers who can focus to build different applications instead of managing them to the cloud servers.

2) Amazon Route 53

The name itself suggests that at the port no. 53, the AWS provides the DNS services to its applications. It easily and effectively connects the EC2 instances or Amazon S3 bucket, and it also provides the routing information to the outer side of the AWS infrastructure.

3) Amazon CloudFront

Low latency and high transfer speed of 5700 Gbps for Hotstar is somehow possible through cloudfront as it provides content delivery network (CDN) service. Any user can directly use the cloudfront who is familiar with other services of AWS.

4) Amazon S3

Storing the data and fetching them as per the need is the advantage of AWS services. To store, retrieve or analyze millions of data from anywhere at anytime can be possible with the AWS S3.

In conclusion, Disney + Hotstar effectively utilizes a range of AWS services to enhance its streaming capabilities and user experience. By leveraging Amazon Route 53 for DNS management, EC2 for scalable computing resources, CloudFront for low latency content delivery.

3) Why Kubernetes and advantages and disadvantages of Kubernetes. Explain how adidas uses Kubernetes?

Ans - Kubernetes is an open-source container orchestration platform that automates the deployment, scaling, and management of containerized applications. It is designed to manage large clusters of containers efficiently.

Key features:

- 1) Automation - Automates deployment, scaling and operations of application containers across clusters of hosts.
- 2) Portability - Works across on-premise, hybrid, or cloud environments, ensuring flexibility in infrastructure choices.
- 3) Self-Healing - Detects and replaces failed containers, reschedules them automatically.
- 4) Service Discovery - Facilitates easy discovery of services within a cluster without hard-coding network settings.
- 5) Load Balancing - Automatically distributes network traffic across the different containers.

Advantages of Kubernetes

- 1) Scalability - Easily scales applications horizontally and vertically based on real-time demand.
- 2) Portability - Allows applications to be moved seamlessly between environments.
- 3) Resilience - Offers self-healing capabilities, replacing failed containers without downtime.
- 4) Efficient Resource Usage - Manages resources effectively, leading to better hardware utilization.
- 5) Ecosystem - Large community support and integrations with DevOps tools like Jenkins, Prometheus, and Helm.

Disadvantages of Kubernetes:

- 1) Complexity: Kubernetes has a steep learning curve and can be difficult to set up and manage, especially for beginners.
- 2) Overhead: Can introduce overhead in terms of computing and operational costs, requiring more resources for orchestration.
- 3) Security Management: While powerful, Kubernetes requires strong expertise to ensure proper security configurations.
- 4) Debugging Difficulty - Identifying and debugging issues in a distributed system like Kubernetes can be complex.

Adidas:

Adidas, one of the world's leading sportswear manufacturers, is leveraging Kubernetes to streamline its operations, enhance its digital services, and optimize its infrastructure. Kubernetes, an open-source container orchestration platform, has provided several benefits to Adidas:

- 1) Scalability and Flexibility - Kubernetes enables Adidas to scale its applications and services dynamically to meet fluctuating demand. During high-traffic events like product releases or major sports events, the platform automatically allocates additional resources to ensure smooth operations.
- 2) Faster Deployment and Development - Kubernetes simplifies the deployment and management of containerized applications. This allows Adidas to develop and release new features and updates more rapidly.
- 3) High Availability and Reliability - Kubernetes ensures high availability by automatically distributing workloads across multiple containers and nodes. If one container or node fails,

Kubernetes automatically replaces it with a healthy one.

- 3) Resource Efficiency - With Kubernetes, Adidas can optimize resource utilization. Containers share the underlying infrastructure efficiently, reducing wasted resources. This translates into cost savings and a greener IT footprint.
- 4) Improved Monitoring and Logging - Kubernetes offers robust monitoring and logging capabilities, allowing Adidas to gain insights into application performance and system health.
- 5) Enhanced security - Kubernetes provides a secure foundation for running containerized applications. Adidas can enforce security policies, isolate workloads, and apply access controls to minimize the risk of security workloads.
- 6) Multi-Cloud Strategy - Kubernetes supports multi-cloud deployments, allowing Adidas to run its applications across various cloud providers or on-premises data centers.
- 7) Continuous Integration and Continuous Delivery (CI/CD) - Kubernetes integrates seamlessly with CI/CD pipelines. Adidas can automate the testing and deployment of code changes, ensuring that new features and updates are delivered to customers quickly and reliably.

- (Q4) Ans) What are Nagios and explain how Nagios are used in e-service
- 1) Nagios is an open-source monitoring system that enables organizations to monitor the IT infrastructure, including servers, networks, devices and applications. It helps ensure that systems are running smoothly by providing real-time monitoring, alerting, and reporting capabilities. Nagios can detect issues such as downtime, performance degradation, and configuration errors, allowing administrators to respond proactively to potential problems.
- How Nagios is used in e-service.
- 1) Infrastructure Monitoring - Nagios continuously monitors servers, databases, and network devices in an e-service environment to ensure they are operational.
- 2) Performance Monitoring - It tracks various performance metrics such as CPU load, memory usage, disk space, and network traffic. This data helps e-service providers maintain optimal performance and scalability.
- 3) Alerting and Notifications - Nagios can send alerts via email, SMS or other communication methods when it detects issues.
- 4) Service Monitoring - It monitors specific e-services such as web applications, APIs and email servers to ensure they are functioning correctly.
- 5) Log Monitoring - Nagios can be integrated with other monitoring and management tools, allowing for comprehensive oversight of the IT environment and enabling more sophisticated alerting and reporting mechanisms.
- 6) Integration with other Tools - Nagios can be integrated with other monitoring and management tools, allowing for comprehensive

oversight of the IT environment and enabling more sophisticated alerting and reporting mechanism.

- 7) Customizable Dashboard - It provides dashboards that give a visual overview of monitored infrastructure, helping teams to quickly assess the health of their e-services.
- 8) Historical Data Analysis - Nagios stores historical performance data, which can be used for trend analysis and capacity planning. E-service providers can ensure high availability and performance of their applications, enhancing user satisfaction and trust in their service.