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Advance DevOps Assignment No. 1

Q2] Use S3 bucket and host video streaming.

Ans] Steps to use S3 bucket and host video streaming :-

1] First, we need to create an AWS S3 bucket. To do so, click on 'S3' in the services section and click on 'Create bucket'. Give your bucket a name and ensure that you block all public access so that unauthorised users do not access the video.

2] Keep other options as default and click on 'Create bucket'. The bucket gets created.

3] Next, we have to upload our video. To do so, click on the name of your bucket and click on 'Upload'.

4] Then, click on 'Add files', navigate to your video file, select it and click on 'Upload'. Your video gets uploaded.

5] Now, if we were to try to view the video, an 'Access Denied' error appears. This is because we configured our bucket to make sure that it cannot be accessed publicly. To fix this error, we must set up CDN (Content Delivery Network) using CloudFront.

6] Click on 'CloudFront' in Services tab and click on 'Create a CloudFront distribution'. In the 'origin domain' box, select your S3 bucket.

7] Under 'Origin access', ~~click on~~ select 'Origin access control settings' and click on 'Create control settings'. Give your control setting a name, keep other options as default and click on 'Create'.

8] Under 'Viewer protocol policy', select 'Redirect HTTP HTTPS' so that the connections are secure. Under 'Web Application Firewall (WAF)', click on 'Enable security protections' to keep the application secure.

9] Keep all other options as default and click on 'Create distribution'. Your distribution is created.

10] Next, click on 'Copy policy' button to copy the policy. Then, click on 'Go to S3 bucket permissions to update policy'. This opens a permissions tab, in which, in the 'Bucket policy' section, paste the policy that was previously copied by clicking on 'Edit' and pasting. Then, save the changes.

11] Then, copy the 'Distribution domain name' from the page of the distribution you created and your video key by clicking on the video you uploaded in the 'Buckets' page. ~~Paste~~

12] Paste both of these into the browser and press 'Enter'. The video you uploaded is displayed. This shows how video streaming was hosted using AWS S3 bucket.

Q: Discuss BMW and Hotstar case studies using AWS.

Ans:

- BMW case study on AWS:

BMW, a global leader in automotive manufacturing, leveraged AWS to drive innovation and optimise key operations, from enhancing manufacturing processes to delivering advanced connected car services. AWS provided the necessary scalability, security and computational power required to modernise BMW's IT infrastructure, enabling real-time data analysis and supporting the development of next-generation automotive technologies.

A major part of BMW's AWS implementation was the creation of a scalable and secure connected car platform that processes millions of events daily. AWS services like Amazon EC2, S3 and IoT enabled real-time data processing, while data lakes built using Amazon S3 and AWS Glue managed the immense volumes of vehicle-generated data. Additionally, analytics tools such as Amazon Redshift and AWS Lambda allowed BMW to extract actionable insights, improving both customer experiences and operational efficiency across the company.

AI and machine learning, powered by Amazon SageMaker, further enhanced BMW's offerings by enabling predictive maintenance and personalised services like voice-activated commands and navigation. Leveraging Auto Scaling and Elastic Load Balancing, BMW reduced infrastructure costs and achieved the flexibility to meet fluctuating demands, ensuring

that the company remained agile in a fast-changing market.

As a result, BMW improved its connected car services, streamlined manufacturing processes and built a more adaptable IT infrastructure, all while reducing costs and enhancing operational efficiency.

- Hotstar Case study on AWS :-

Hotstar, India's largest streaming platform, partnered with AWS to handle massive traffic surges during live events such as the Indian Premier League (IPL). AWS's elastic scaling capabilities enabled Hotstar to deliver high-quality content to millions of concurrent viewers without interruptions or delays, even during peak traffic events.

By utilising Amazon EC2 Auto Scaling, S3 and CloudFront, Hotstar ensured seamless streaming even during the most significant traffic spikes. AWS's global content delivery network, CloudFront, minimised latency and ensured high performance across regions, including remote areas. Hotstar also relied on AWS Media Services, Amazon Kinesis and AWS Lambda for real-time video-processing and analytics, which allowed them to monitor user behaviour and adjust the streaming experience on the fly.

AWS's pay-as-you-go model provided cost efficiency by enabling Hotstar to scale its infrastructure dynamically, reducing the need for overprovisioning. This allowed Hotstar to set a global record during

the 2019 IPL final, streaming to over 25 million concurrent viewers while maintaining high availability and consistent streaming quality.

To conclude, both BMW and Hotstar utilised AWS's services to transform their operations and meet the challenges of their respective industries. BMW used AWS to enhance connected car services, manufacturing and data analytics, while Hotstar relied on AWS's scalability to handle large viewer spikes during live events. AWS's flexibility, cost-efficiency and scalability allowed both companies to innovate, adapt and thrive in highly competitive markets.

Q] Why Kubernetes and advantages and disadvantages of Kubernetes. Explain how Adidas uses Kubernetes.

Ans] Kubernetes is an open-source platform that automates the deployment, scaling and management of containerised applications. Containers provide lightweight, portable and isolated environments, and Kubernetes helps run them efficiently in production. Its primary purpose is to manage containers across a cluster, ensuring applications are reliable, scalable.

Advantages of Kubernetes are :-

i] Scalability - Kubernetes automatically adjusts application resources based on demand, handling traffic spikes and load changes effortlessly.

ii] High Availability - It ensures applications stay up and running by distributing workloads across nodes and restarting containers that fail.

iii] Portability - Kubernetes is compatible with multiple cloud platforms (AWS, GCP, Azure) and on-premise systems, offering flexibility in deployment.

iv] Self-healing - Kubernetes can restart or replace failed containers, kill unresponsive ones and reschedule them as needed to maintain application health.

v] Zero Downtime Updates - It supports rolling updates for applications, ensuring no downtime and allows for rollbacks if something goes wrong.

Disadvantages of Kubernetes are :-

i] Complex Learning Curve - Kubernetes' intricate architecture can be challenging for beginners to understand.

ii] Resource Consumption - Running Kubernetes requires

considerable resources, which may not be ideal for smaller applications or companies with limited infrastructure.

iii) Operational Complexity - Managing a Kubernetes cluster involves significant work, including monitoring, updates and security maintenance.

iv) Security Challenges - While Kubernetes has built-in security features, its complexity introduces more potential vulnerabilities, making security harder to manage.

v) Cost Considerations - Using Kubernetes, especially in the cloud, can become expensive due to the costs of managing clusters, nodes and the need for specialised expertise.

Adidas adopted Kubernetes as part of its digital transformation to modernise its infrastructure and scale its digital services. By shifting from monolithic applications to microservices, Adidas became more agile and responsive to evolving market needs.

Adidas uses Kubernetes in the following ways:-

i) Microservices Transition - Adidas restructured its applications into microservices which Kubernetes orchestrates. This move allows Adidas to develop and release new features quickly and flexibly.

ii) E-commerce scalability - During high-demand events such as product launches, Kubernetes enables Adidas to scale automatically, ensuring a seamless customer experience even during traffic surges.

iii) Cloud Strategy - Adidas employs a hybrid cloud model.

Kubernetes allows them to run workloads across on-premise systems and the cloud, providing the scalability of cloud environments while keeping sensitive data secure.

iv) CI/CD Pipeline Support - Kubernetes is crucial for Adidas' continuous integration and continuous deployment (CI/CD) processes, allowing their development teams to quickly and safely release updates to production.

v) Automation and Resilience - Kubernetes automates failure recovery, ensuring Adidas' eCommerce platforms, mobile apps and internal systems are resilient and available 24/7.

By utilising Kubernetes, Adidas manages the complexity of its applications, scales to meet demand and consistently delivers a reliable user experience globally.

Qu) What are Nagios and explain how Nagios are used in E-services?

Ans) Nagios is an open-source monitoring tool used to oversee the performance and availability of systems, networks and infrastructure. It allows IT administrators to track critical components such as servers, applications, services and network devices, providing timely alerts and performance data to prevent disruptions and resolve issues quickly.

Key features of Nagios are:

i) Monitoring of infrastructure components - Servers, network devices and applications can be monitored to ensure smooth operations.

ii) Alerting System - Sends out alerts (via email, SMS etc) when a problem is detected, such as server downtime or high resource usage.

iii) Custom Plugins - Nagios supports a wide range of plugins that allow customised monitoring for different systems and applications.

iv) Web Interface - Provides a dashboard for real-time status, alerts and historical data reports.

v) Scalability - Can handle monitoring of environments ranging from small to large by distributing tasks across multiple Nagios servers.

vi) Performance Reports - Offers historical performance, uptime and availability data for analysis and reporting.

In e-services such as e-commerce, online banking or cloud services, Nagios plays a crucial role in ensuring high availability, security and performance.

It continuously monitors the various components that power e-services, alerting administrators when problems arise and helping to quickly address issues.

Some important use cases in e-services are :-

i) Uptime Monitoring - Nagios monitors critical services (eg payment gateways, user authentication) to ensure they remain online, sending alerts when downtime occurs.

ii) Performance Monitoring - It tracks server and resource usage (CPU, memory, bandwidth) to ensure applications maintain optimal performance. Slow performance triggers alerts so teams can resolve issues.

iii) SLA Monitoring - Nagios helps e-service providers track uptime and performance to ensure compliance with Service-Level Agreements (SLA's) and generate detailed reports.

iv) Application / Database Monitoring - Monitors the health of applications, like web servers, and databases, like MySQL, to detect problems like slow response times or downtime, enabling quick resolution.

v) Security Monitoring - By integrating with security tools, Nagios helps monitor unauthorised access attempts, network vulnerabilities and abnormal traffic patterns.

vi) Custom Alerts for Critical Services - E-services often rely on key components like shopping carts or APIs. Nagios allows custom configurations to focus on these critical areas, ensuring continuous functionality.