

Adv DevOps Assignment No. 1

Q.1. Use S3 Bucket and host video streaming.

Soln: Steps to host video on AWS S3 bucket :-

- ① Download any sample videos from internet
- ② Now break the whole video into smaller segments so that it can be easily transmitted over network.
- ③ To make smaller chunks we would use ffmpeg tool, the general syntax is `ffmpeg -i <VIDEO-NAME> -profile:v baseline -level 3.0 -start_number 0 -hls_time 3.5 -hls_list_size 0 -f m3u8 output.m3u8`
- ④ Ensure you download the ffmpeg before executing above command.
- ⑤ After that create a new S3 bucket, name it and allow public access.
- ⑥ Now, change the bucket policy so that anyone can access bucket objects.
- ⑦ We also need to setup sops policy so that any endpoint can request for resources of bucket.
- ⑧ After setting up all necessary configurations, we need to upload video segments that we had created previously.

- ⑨ Create a new folder named 'his' inside bucket and upload all the video segments in it.
- ⑩ Now we would create a simple HTML document that would be hosted on S3 bucket so that video can be played.
- ⑪ The HTML file would contain the link or the main playlist of the video segments.
- ⑫ Open the link provided inside object properties.
- ⑬ The video will start streaming.

Q.2

Discuss BMW and Hotstar case studies using AWS

Soln:-

BMW Case Study :

BMW, a leading automotive manufacturer, has been at the forefront of digital transformation in automotive industry. To enhance its services, BMW implemented AWS for various applications, including data analytics, machine learning, and internet of things (IOT) solutions.

Key Initiatives :-

① Connected Vehicles :

- BMW uses AWS to analyze data from its connected vehicles. The cloud infrastructure supports real-time data processing, which helps in enhancing vehicle safety and performance.
- By utilizing AWS IoT core, BMW can securely connect its vehicles to the cloud, enabling features like remote diagnostics and over-the-air updates.

② Data Analytics :

- AWS data analytics resources help BMW process vast amounts of data generated from vehicles. The insights gained from the data can inform product development and improve customer experiences.
- Using tools like Amazon SageMaker, BMW develops machine learning models to predict maintenance

needs and enhance customer service

③ Customer Engagement:

BMW's digital services including the BMW connected app, benefit from AWS's scalability. This app provides users with personalized vehicle information, driving recommendation and service reminders.

Applications:

- a) BMW connected app: This app provides drivers with personalized insights including driving behaviour analysis, trip history and reminders for maintenance.
- b) Tailored services: By analyzing user data, BMW can offer personalized services such as suggesting routes based on driving habits or providing relevant content like music or podcasts during drives.

Challenges Faced by BMW:-

① Data Security and Privacy:

With vehicles constantly sending and receiving data, ensuring the security of this information is crucial. BMW had to implement robust security measures to protect sensitive user data from potential breaches.

② Scalability:

As BMW continued to roll out connected features across its vehicle lineup, the demand for data storage and processing power increased significantly. They needed a cloud infrastructure that could scale efficiently to handle this growth.

③ Integration with Legacy systems:

BMW had to integrate new cloud-based systems with existing legacy systems in manufacturing and operations, which required careful planning and execution.

Outcomes and results:-

① Improved vehicle safety:-

Enhanced safety features developed through data analysis had led to a decrease in accidents and improved customer confidence in BMW vehicles.

② Increased customer satisfaction :

With personalized services and timely notifications, BMW has improved customer engagement, leading to higher satisfaction and loyalty.

③ Operational efficiency :

Predictive maintenance capabilities reduce the time and cost associated with repairs, optimizing service operations and improving the overall customer experience.

④ Innovation in Product Development:

Access to real-time data allows BMW to innovate continuously, adapting vehicles to meet customer preferences and regulatory requirements more effectively.

⑤ Competitive Advantage:

By investing in digital technologies and connected vehicle solutions, BMW has positioned itself as a leader in the automotive industry's digital transformation, staying ahead of competitors.

Conclusion :-

BMW's integration of AWS into its operations has transformed how it approaches vehicle manufacturing, customer engagement, and service delivery. By leveraging cloud technology, BMW not only enhances its product offerings but also improves operational efficiency and customer satisfaction. This case study illustrates the importance of digital transformation in maintaining competitiveness in the rapidly evolving automotive industry.

Hotstar Case study :-

Hotstar, also known as Disney + Hotstar, is a leading streaming service in India that offers a wide range of content, including movies, TV shows and sports. The platform faced challenges with scalability and performance during high-traffic events, such as live sports broadcasts.

Key initiatives :-

① Scalability and Performance :-

- Hotstar migrated its entire infrastructure to AWS to handle massive spikes in user demand, especially during events like the IPL cricket matches.
- By leveraging AWS Auto Scaling and elastic load balancing, hotstar ensured seamless streaming experiences, even with millions of concurrent users.

② Content delivery :

Hotstar utilizes Amazon CloudFront, a content delivery network (CDN), to deliver video content quickly and efficiently to users across India. This reduces latency and improves buffering times.

③ Data insights and Personalization :

- Hotstar uses AWS data analytics tools to gather insights on user behaviour and preferences. This data

is instrumental in curating personalized content recommendations for users.

The integration of machine learning services, like Amazon SageMaker, helps in enhancing user engagement through targeted recommendations and marketing.

Challenges faced before using AWS cloud services:-

① Scalability issues:

Prior to migrating to AWS, Hotstar struggled with low scalability during peak times, which sometimes led to service interruptions or poor user experiences.

② Data security:

With a large volume of user data, ensuring data security and privacy was a significant challenge. Hotstar needed to comply with regulations while protecting user information.

③ Integration with legacy system:-

Hotstar had to integrate new cloud-based services with existing infrastructure, which required careful planning and execution to ensure seamless functionality.

Outcomes and Benefits:-

① Enhanced streaming experience:

Hotstar successfully managed to support millions of concurrent viewers without performance issues during peak times, especially during major sport events.

② Increased user engagement:

The personalized recommendation engine led to higher user engagement, with users spending more time on the platform and discovering new content.

③ Improved Operational efficiency:

By leveraging AWS tools for data analysis and resource management, Hotstar reduced operational costs and improved the efficiency of its content delivery system.

④ Better Data-Driven decisions:

Insights gained from data analytics allowed Hotstar to make informed decisions regarding content acquisition and original programming, improving overall content strategy.

Conclusion:-

Hotstar's strategic use of AWS has transformed its streaming platform into a highly efficient, user-friendly service. By leveraging cloud technology, Hotstar has improved its ability to handle high traffic, deliver content quickly and provide personalized recommendations to users.

Q.3

What is Kubernetes and advantages and disadvantages of Kubernetes. Explain how adidas uses Kubernetes.

Soln:- Kubernetes is an open-source platform that helps automate the management of containerised applications. In simple terms, it makes sure your app runs smoothly by handling where and how your app's parts (called containers) are placed across servers. It also manages scaling (increasing or decreasing resources), self healing (restarting failed containers), and rolling out updates without downtime.

Advantages of Kubernetes :-

- ① Scalability : Automatically adjusts resources as needed, scaling up or down.
- ② Self-Healing : Automatically replaces failed or unhealthy containers, ensuring your app stays up.
- ③ Automated Rollouts and Rollbacks : Updates are smooth, and if something goes wrong, it can revert to a previous state.
- ④ Resource Optimization : Efficiently uses hardware resources.
- ⑤ Portability : Works across different environments (cloud, on-premise, or hybrid settings).

Disadvantages of Kubernetes :-

- ① Complexity : Kubernetes can be tough to set up and manage, especially for beginners.

- ② Resource-Intensive :- It requires a lot of computing resources, making it costly for small-scale applications.
- ③ Steep learning Curve :- Understanding and managing Kubernetes can take time and effort.
- ④ Networking Challenges :- Configuring networking for containers can be tricky and may require additional tools.

How Adidas uses Kubernetes :-

Adidas relies heavily on Kubernetes to power its global e-commerce platform and digital operations.
A simple breakdown of how Kubernetes helped Adidas:

① Scaling for High Traffic :

Adidas deals with huge traffic spikes, especially during special sales or product launches. Kubernetes helps Adidas automatically scale its services up or down based on the number of users. When traffic is low, Kubernetes reduces resources, saving money. When traffic surges, Kubernetes increases the resources, so the website stays fast.

② Faster updates and features :-

Adidas can quickly roll out new features or updates without taking the entire website down. Kubernetes allows them to test new features in small

batches (rolling updates) before releasing them fully. This ensures fewer issues and better user experience.

③ Stability and Performance:

Adidas needs its services to be reliable 24/7. If something goes wrong, Kubernetes can automatically replace faulty components, ensuring their online platforms don't experience much downtime. It keeps things running smoothly behind the scenes.

④ Multi-Cloud flexibility:

Adidas uses a combination of cloud providers. Kubernetes allows them to easily move workloads between different clouds or run them in multiple places at once, reducing dependence on one provider.

~~Benefits for Adidas by using Kubernetes:-~~
~~Summary~~

- ① Reliability: self-healing and fault-tolerant systems ensure that their services stay up, even if something goes wrong.
- ② Flexibility: They can operate across multiple cloud providers, minimizing vendor lock-in.
- ③ Cost efficiency: By dynamically scaling resources, they save money during low-traffic periods.
- ④ Agility: Kubernetes enables Adidas to quickly roll out and test new features, staying competitive in the fast-paced world of online retail.

Q.4. Explain Nagios and explain how Nagios are used in E-services.

Soln:

Nagios is an open-source monitoring system used to track and monitor the health and performance of IT infrastructure, including servers, networks, application and services. It helps identify potential issues before they become critical problems by sending alerts if something goes wrong or doesn't meet defined performance metrics.

Nagios monitors various metrics such as:-

- ① CPU usage
- ② Memory consumption
- ③ Network traffic
- ④ Disk usage
- ⑤ Service availability

Key Features of Nagios:-

- ① Real-Time Monitoring :- Continuously checks the status of your infrastructure
- ② Alerting system : Notifies administrators through email, SMS or other methods if something fails or needs attention
- ③ Custom Plugins : You can extend Nagios capabilities with plugins to monitor specific services or applications

- ④ Historical reports: Provides log and performance data over time to help in identifying trends and potential issues
- ⑤ Scalability :- Nagios can monitor small setups as well as large infrastructure with thousands of devices.

Nagios is a powerful open-source monitoring system that is widely used in e-services to ensure the smooth operation of various IT infrastructure components such as servers, networks, applications and services.

Nagios effectively used in E-services by :-

- ① Server Health Monitoring: Nagios tracks server performance (CPU, memory, disk space) and sends alerts if any issues arise, helping prevent server failures.
- ② Network Monitoring: It monitors network traffic, latency and bandwidth, identifying bottlenecks or connectivity issues to ensure uninterrupted service.
- ③ Service Monitoring: Nagios checks if critical services (web, database, email services) are up and running, notifying admins if any service goes down.
- ④ Application Monitoring: - It monitors application performance (response times, error rates), ensuring optimal user experience.
- ⑤ Database Monitoring: Nagios checks database health, tracking query performance and detecting potential issues like slowdowns or overloads.

- ⑥ Security Monitoring:- It monitors firewall and logs for potential security threats, providing timely alerts for unauthorized access or suspicious activity.
- ⑦ Alerting and notification :- Real-time alerts via email / SMS allow quick action on detected issues, reducing response time and downtime.

~~Nagios help e-services by monitoring critical infrastructure, preventing downtime, ensuring security, and maintaining a high-quality user experience.~~

J.R